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THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY.

Publishing Office, No. 42 Pine Street.

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

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☞ An asterisk (*) denotes an illustrated article.

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WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit Correspondence for publication from all among them who make the study of these subjects a pleasure, or a profession.

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SIXTH ANNUAL MEETING OF THE AMER. GAS-LIGHT ASSOCIATION.

We have received from the Secretary of the American Gas-Light Association the notice and letters relating to the next meeting of the Association, as given below.

We take great pleasure in announcing the fact that Prof. Morton has consented to give a lecture, before the Association, on the timely topic of "Electric Light," a subject of great interest to every member at the present time.

It is to be hoped that there will be a full attendance, and that every member will prepare a paper on some subject relating to illuminating gas, and lay the same before the Association.

Papers on the following subjects will be of great interest to all, viz.:

On removable seals to dip-pipes; on scrubbers; on lime and iron purification; on yields, per retort, per pound or ton of coal, per man, etc., at the same time giving the name of the coal or materials used—the percentages of each, when a mixture is used, and also the amount of loss in unaccounted-for gas.

To facilitate the comparisons of results obtained, the yields should be given in *candle feet;* that is—the number of feet multiplied by the candle power. For instance, if the yield per retort be 6,000 feet, of 16 candle gas, per day, then the total yield be $6,000 \times 16 = 96,000$ candle feet per retort. By the application of this rule to all the items, the various results obtained by the different members can be readily compared.

OFFICE AMERICAN GAS-LIGHT ASSOCIATION,
150 BROADWAY, N. Y. CITY.
June 8th, 1878.

To the Members of the Association:

The next meeting of the Association will be held in New York city, on the third Wednesday of October; and, by direction of the Association, will continue in session three days.

The members of the Association are all cordially and earnestly requested to prepare each a paper, on some branch of the general manufacturing industry, and to present the same to the meeting.

Every member present at the meeting held at Cincinnati, last Fall, will recall to his mind with pleasure that most interesting and profitable meeting.

The generous hospitality of the Cincinnati Gas Light Company at that meeting, cannot be excelled at our next meeting. Neither can the excelland instructive papers be excelled, except by a united and earnest effort on the part of all the members.

Let every one try to *make* the coming meeting *the best* of any the Association has yet held.

CHARLES NETTLETON,
Secretary.

As a commencement of the effort, and indication of the "coming feast," the members are requested to notice the correspondence below.

AMERICAN GAS-LIGHT ASSOCIATION,
OFFICE NO. 150 B'WAY, N. Y. CITY.
New York, May 21st. 1878.

Prof. HENRY MORTON,
Pres. of Stevens Inst. of Technology,
Hoboken, N. J.

Dear Sir:

The American Gas Light Association will hold their next meeting, in this city, on the 16th, 17th, and 18th days of October next.

On behalf of the Association, in the interest of Science and for the increase of scientific knowledge among the members of the Association, on a subject which is of great moment to them, we would respectfully ask from you the favor of a lecture on the subject of "Electric Light," at such time during the meeting as may be most agreeable to you.

We have the honor to be,
Very respectfully and truly, yours,
CHARLES ROOME,
President.

CHARLES NETTLETON,
Secretary.

STEVENS INSTITUTE OF TECHNOLOGY,
HOBOKEN, NEW JERSEY,
June 7th, 1878.

CHARLES ROOME, Esq.,

Dear Sir: In reply to your kind invitation of the 21st May, I would say that it will give me pleasure to address the members of the American Gas-Light Association, on the subject of "Electric Light," at any time during their next meeting.

I would propose the Lecture Hall of the Stevens Institute as the most convenient place.

I remain,
Yours truly,
HENRY MORTON.

STREET LIGHTING.

The recent prices at which the public lighting has been contracted for in New York city has given rise to a good deal of misrepresentation in the many cities throughout the country where contracts are being made. The price in New York is, of course, always looked for as a standard; and, under any circumstances, the price here ought to be lower than in almost any other city, owing to the larger quantity made and sold by the city companies. But the case at present is one that always exists wherever a city has too many gas companies. All of them seeking for business—the natural result is a competition which almost always proves ruinous in the end.

This is carried on as long as the companies can stand it, and while it lasts, the taxpayer at large may reap a temporary advantage; still, those who "dance have to pay the piper," sooner or later, in some way or other. If gas companies, for any reason, see fit to do a portion of their business at a loss, some one in the community has to lose by it, and there is just so much the less ability to pay taxes, or so much less taxable property in the community; and what the taxpayers save at one end they have to make up at the other.

It is popular nowadays to shout "save the people's money," "force the monopolies to come down," etc., etc.

But what possible equity can there be in expecting one class of taxpapers to throw away their property for the benefit of another class!

If all the companies in New York city, or in Brooklyn, could be consolidated into one company in each city, on a capital basis that would represent something like the true value of the works, business, etc., there is no doubt but that gas could be furnished at a much lower figure than it now is, and return a good profit; but so long as the people demand half a dozen, or more, separate companies in each city, for the purpose of enjoying the so-called benefits of competition, just so long they must be content to pay the additional expense of maintaining so many different establishments, with their offices, officers, duplicate machinery, apparatus, pipes, etc., etc. Detroit, Michigan, seems to be quite excited over this question, and we give some account of it in another column.

Brooklyn, also, has been stirred up to the very depths by an attempt to make contracts for street lighting. Aldermen talk learnedly and patriotically, pass resolutious, the Mayor issues messages and writes vetoes, and all this because the dim, smoky light of naphtha lanterns was seen glimmering on the outer circle of the Council Chamber; and some one wished to illuminate Williamsburgh therewith at a less price than gas was offered. It seems to us that naphtha lanterns are dear at any price, where gas can be had. The Harlem district (New York) tried them, or had them forced upon them; but they did not like them, and would have no more of them.

Now, poor Williamsburgh is to have another woe inflicted on its people. As if the smells of naphtha arising from its oil works were not enough, without having the sight of its people offended with its burning flames. Poor Brooklyn! Last year it was kerosene in the houses and shops; this year naphtha in its street lights.

Is there no peace for a Brooklyn gas maker? Verily; it seems as though it were vain to try to suit some people.

It is a very serious question whether the good people of Brooklyn would be satisfied if the gas were given them. They would want something different; and, what is still more wonderful, is that there are many other places that differ but slightly from the city of Churches in this respect.

Gas Motors.

The name of gas engine is now generally applied to any motor wherein a detonating mixture is employed as a source of power. This mixture is commonly composed of air and illuminating gas in proportions varying between extended limits, starting from seven parts of air to one of gas, this ratio furnishing the necessary oxygen to consume the combustible elements. The effect of the heat suddenly produced at the moment of inflammation is to expand the gaseous products of combustion, increase their pressure, and render them capable of exerting considerable effort. The temperature after explosion depends upon the composition of the mixture. Gas motors have many points of similarity to steam and hot air engines, as in all the movement is due to the expansion of a gaseous fluid, the essential differences residing in the manner in which the heat is communicated to the intermediary agent. While in the steam engine the heat is devoted to the transformation of water into steam in an exterior apparatus, and in the hot air engine the dilatation of air is produced in a furnace independent of the cylinder; in the gas engine the heat is developed within the cylinder itself, and in the midst of the gaseous mass which serves as the motor fluid. The energy is produced at the moment needed, and there is no storing up of heat. Hence it will be seen that the gas engines find a special applicability in cases where continuous work is not required.

Simple as is the principle of the machine, its practical realization is a complex difficulty. The heat developed by the inflammation is rapidly communicated to the air in excess and to the products of combustion, so that instead of a gradual expansion an explosion takes place, the violence of which cannot be reduced by augmentation of the air cushion. Hence the sudden shocks incompatible with the regular equable motion which the motor should have. In addition to this obstacle is the rapid heating of the cylinder, and consequent radiation of heat which is thus lost.

The first successful gas engines made abroad were those of Hugon, in 1858 and Lenoir in 1860. The Otto & Langen machine, subsequently constructed, reduced considerably the expenditure of gas, but it was insupportably noisy, and therefore came into no extended use. Of the most improved gas motors existing abroad at the present time, M. Armengaud gives full details in a paper recently read before the French Société des Ingenieurs Civils. In the Lenoir engine the mixture of gas and air is admitted into the cylinder at atmospheric pressure, which is maintained until the piston has made half its stroke; the admission of a spark determines the explosion. In the new systems of Otto and of Simon, the detonating mixture is compressed first; and exploded by an ignited gas jet when under this pressure. The inflammation is thus gradual, and a progressive explosion is caused. Without going into the details of the separate machines, it will suffice here simply to point out the essential features. In the new Otto engine the piston advancing first draws in the mixture of gas and air. The valve is then shut and the piston returns, compressing the mixture (to about two atmospheres). As soon as the end of the stroke is reached a gas jet ignites the compressed gas, and the piston is thus caused to advance. On the return stroke, the cooled and expanded products of combustion are driven out. An important feature is the arrangement of the valve, so that at first a mixture of 15 parts of air to 1 part of gas is admitted, and afterwards one composed of 7 parts of air to 1 of gas, this causing slow or retarded combustion, the more explosive material being nearest to the gas flame at the moment of ignition. The loss of heat due to radiation in this engine is stated to be but 42 per cent. as against 85 per cent. in the Lenoir machine, and its efficiency three times as great. The expenditure of gas does not exceed, the inventor says (in high power machines), 23·9 cubic feet horse power per hour.

The Simon engine, while based on the same principles as the foregoing, is differently constructed. The compression of the mixture is done in a separate cylinder, and the air and gas, after compression, are led to the motor cylinder. There the mixture at once meets an ignited jet, which inflames it. It does not enter the cylinder, however, all at once, but in small quantities, which are successively ignited, thus determining true gradual expansion. The heat developed is small, and a very limited quantity of water prevents overheating of the cylinder. The movement is regular and even. According to M. Simon, the expenditure of gas is 17·6 cubic feet per horse power per hour.

The Bisschop engine belongs to that mixed class which utilize the explosion to cause the ascent of the piston, and atmospheric pressure to determine its descent. The chief advantage of the machine is the mechanical arrangement, which allows of high piston speed. No water is used for cooling, this being effected by radiating surfaces representing five times the exterior surface of the cylinder. Up to the present time only small engines of this type have been built, chiefly suited for running sewing machines. According to M. Armengaud, the cost of operation is 2 cents per hour for the one-fifteenth horse-power, and 5 cents per hour for the one-eighth horse power machine.

In the Ravel engine, the explosive force of the mixture is employed to move the piston, which is inclosed wholly in the cylinder, motion being taken from the cylinder, and not from the piston, a paradoxical arrangement easily understood from the following:

In each end of the cylinder is a chamber where explosions take place, and the cylinder itself is hung on trunnions, which rest in journals, and which, prolonged, carry the pulley from which the power is taken. When the gas is exploded by a flame, the piston is driven to the opposite end of the cylinder. Its weight at the extremity then causes the latter to overbalance, and hence the cylinder rotates on its trunnions; as soon as that end reaches the lowest point of revolution, another explosion sends the piston to the further extremity, and thus the cylinder keeps on rotating. No data of the efficiency of the machine are given, but it is said to be quite economical.

The above constitutes but a brief summary of the more important European improvements made in the gas engine during the last two years. To these may be added a new application of the motor suggested by M. Dupuy de Lome in impelling balloons. He states that his balloon could be driven at the rate of 13·2 miles per hour if a gas engine of 8 horse power could be contrived, the weight of which should not exceed that of eight men *plus* that of the mechanical device by which their power might be applied to a rotating shaft. The volume of the gas in his balloon is 121,926 cubic feet, the expenditure of which, supposing a portion were used to drive the engine, would be but 282·4 cubic feet per hour, or only about 1·431 part of the total contents. During his experiment of February 2, 1872, M. de Lome remained two hours in the air, using a propeller driven by hand. With the engine he might have travelled 26 miles

in this period. For flying machines, where large volumes are to be avoided, detonating mixtures of oil vapor and air would probably be found better suited as the source of power.—*Scientific American.*

West of Scotland Association of Gas Managers.

The Sixth Annual Meeting of this Association was held on Thursday, April 25, in the large room of the Public Museum, Paisley. There was a large attendance of members. Mr. James McGilchrist (Dumbarton) President of the Association, occupied the chair.

ADOPTION OF MINUTES, ETC.

The SECRETARY (Mr. R. S. Carlow, Port Glasgow) read the minutes which had been held by the Committee of the Association since the previous half-yearly meeting at Helensburgh.

THE PRESIDENT, in moving the adoption of these minutes, said: I beg to call special attention to the low state of the funds, which, in a great measure, results from the non-payment of subscriptions by gentlemen whose names are on the roll as Members of the Association. In the course of today's proceedings, a motion dealing with this unsatisfactory state of affairs will be proposed for the acceptance of the meeting. This is a state of matters that we must get rectified. It is useless to have Members on the roll if they will not pay for their connection with the Association. I have also to state that, at a committee meeting held this morning, it was unanimously agreed to ask you to confer the distinction of honorary membership upon Mr. Hislop, of Paisley, who has done everthing in his power to make this meeting a success, and I need scarcely add that, so far, he has been very successful.

The minutes were adopted, and the proposal of the Chairman was cordially adopted.

MR. HISLOP—I have to thank you for the honor you have conferred upon me in electing me to the position of an Honorary Member of your Association. I appreciate and value this kindness very much, I can assure you; and if I have done anything in the way of contributing to the success of this meeting, I shall be happy; and if anything I can do will contribute to the further success of the meeting, I will willingly place my services at your disposal.

ELECTION OF OFFICE-BEARERS.

THE PRESIDENT—The committee today have drawn up a list of office-bearers for the ensuing year, which I beg to submit to the meeting. Of course any member has the right to propose any gentleman he thinks proper. The proposed office bearers are as follows:

President—Mr. Samuel Stewart, Greenock.

Vice-President—Mr. William Young, Clippens.

Secretary—Mr. R. S. Carlow, Port Glasgow.

Treasurer—Mr. W. Smith.

Committee—Messrs. D. Jeffrey, W. Fairweather, Levi Monk, R. Mitchell, Jas. M'Gilchrist, John Fleming, S. Dalziel, and Jas. Renfrew.

These gentlemen were unanimously appointed.

THE PRESIDENT said—Mr. L. Hislop, Uddingston, retires from the office of Auditor, held by him for two years. The other Auditor is Mr. John Walker, Ayr, who continues in office for another year.

On the motion of Mr. RENFREW, Mr. Samuel Black, Alexandria, was appointed in room of Mr. Hislop.

ADMISSION OF NEW MEMBERS.

The SECRETARY submitted the following list.

Extraordinary Members.

Andrew Spencer, Coal Merchant, Glasgow.

John Wilkie, Lime Merchant, Greenock.

Joseph Gilmour, Boynton Fire Clay Works, Kilmarnock.

R. M. Sutherland, Manager, Chemical Works, Falkirk.

Wm. Donald, jun., Abbey Works, Paisley.

Ordinary Members.

John Davidson, Dawsholm Gas Works, Glasgow.

James Robb, Gas Manager, Ayr.

Charles Reilly, Gas Manager, Strabane.

John Macfarlane, Gas Manager, Stornoway.

On the motion of the President, seconded by Mr. Renfrew, these gentlemen were unanimously elected.

ARREARS OF SUBSCRIPTIONS.

MR. MITCHELL (Coatbridge)—The matter of arrears is a subject which has been a cause for regret in Associations other than the West of Scotland, and it is a subject which the committee have deemed it their duty to set a strong face against. I take upon myself the liberty of proposing that a committee be appointed, with full powers, to draw up a list of arrears, and that the committee shall have full powers to strike off the roll of membership those parties who are two years in arrears with their subscriptions.

MR. FULLERTON (Motherwell) seconded the motion.

THE PRESIDENT—By the rules, this motion can only come into operation after the next annual meeting.

MR. NIVEN (Dunoon)—It is a great pity that any members should be in arrear with their subscriptions; but perhaps the subscriptions may be too high. Considering the advantages which are derived from connection with an Association like this, I think all members ought promptly and willingly to pay their subscriptions. It should however be remembered that most of the members are "wee" managers, with perhaps very limited incomes. In such cases I think the amount of subscriptions might be reduced. I think it would be unwise to eliminate a number of defaulters, because it would make the Association more select, and in that way it would subvert, to a certain extent, the proposed object of the Association.

THE PRESIDENT—We are indebted to Mr. Niven for the suggestion, and if it were the fact that the "wee" Managers are in arrear, there might be some force in what Mr. Niven has said; but the fact it is mostly those in good positions who are in arrear. With regard to the amount of subscription, this Association charges less than any other than has yet been established—that is, considering the amount of work that it accomplishes. The annual report on the gas supply of Scotland is in itself a great expense, which other and kindred Associations do not incur, and comparing ourselves with the North British, the parent Association, we have a benevolent fund to support, which they have not. Instead of the subscriptions being reduced, they ought to be increased, in order to meet the increasing demands which are being made upon us year after year, to have more efficient reports. But the committee will consider Mr. Niven's valuable suggestion, and bring it up with the report which they will submit to the next annual meeting.

MR. MITCHELL—I should like that special powers should be given to the committee in regard to these arrears. I do not think that it is right the Secretary, who has other duties of a heavy kind, should be troubled in the future as he has been in the past, in writing letters to people who never reply.

MR. FAIRWEATHER—I think there should be a rule to this effect, that, in cases where payment is not made within a limited time, the party should cease to be a member after due notice being given.

THE PRESIDENT—The committee propose to bring some such recommendation before the next meeting.

[To be continued.]

A New Method for Producing Cheap Heating Gas for Domestic and Manufacturing Purposes.

By S. W. Davies, A.R.S.M.

[Concluded from page 234.]

At the works in Battersea, the gasometer is generally kept weighted, so as to give a pressure in the mains of about one and a-half inches to two inches of water. Not the slightest difficulty is experienced in working the apparatus against this amount of resistance, with a water pressure, in the accumulator of 40 lbs. on the square inch.

I have often been asked whether this gas does not become deteriorated by being stored in contact with water. Some people seem to labor under the misapprehension that, because it is produced in part by the decomposition of watery vapor, there is a corresponding tendency towards condensation; they appear to forget that the constituents of the water have been separated by the action of the incandescent fuel, and transformed from a readily condensible, completely—or at least permanently—oxidised gas, or vapor, into two gases, which at ordinary temperatures and pressures are non condensable, but slightly soluble in water, and only one of which is partly oxidised.

To prove, however, that the gas suffers no material change in composition by being stored in contact with water, an analysis was made of a sample that had been kept in the gasholder for more than a week. This gas contained is 100 parts, as follows;

Carbonic oxide.....	CO	=24·3
Hydrogen.....	H	=15·5
Carbonic anhydride.....	CO_2	= 3·4
Nitrogen.....	N	=56·8
Total.....		100·0

On comparing this analysis with those of the unstored gas given above, it is manifest that no bad effect is produced on the gas by storage, and that it may be kept for any reasonable time in a holder without deterioration. This, therefore disposes of the question of the storage of the gas in holders, etc.

I mentioned, however, just now, that in large establishments—such as clubs, hotels, hospitals, barracks, unions, prisons, etc., in which the consumption of gas for cooking and heating purposes would of necessity be large, no holder is required, as the gas can be used direct from the generator. This has been practically demonstrated in the most complete manner at the works of Messrs. Leoni and Co., gas stove and range makers, New Northroad, N. At these works a long series of trials were carried out with the apparatus, and in every case the gas was passed direct from the generator into the 4-inch main, with which the various cooking and heating stoves to be experimented on directly communicated. No pressure-regulator or governor of any kind was employed in these experiments, neither was there any alteration made in the apparatus to adapt it to the use of this gas, except the stopping up of the air-holes in the atmospheric burners.

In one trial two large ovens, each 5 feet high by

2 ft. 3 in. wide, by 2 ft. 6 in. deep, a boiler holding 35 gallons of water, and a large steamer, were joined up to the 4 in. main. At first the whole of the gas produced was turned into the ovens and boiler; in 75 minutes after lighting the gas, the ovens reached a temperature of 400°F., and in 15 minutes more the water in the boiler was at the boiling point. The gas under the boiler was then nearly turned off, that in the ovens being slightly lowered, and the steamer got to work; in 30 minutes after lighting there was an abundance of steam for cooking purposes. This steamer is calculated to cook 1 cwt. of potatoes in about thirty minutes. All this time the ovens were kept at a temperature of 400° F.

The actual quantity of ordinary gas required to work the ovens and boiler, or ovens and steamer, is from 280 to 320 cubic feet an hour. Estimating the quantity of gas produced by the generator at 1,200 cubic feet an hour (which is its outside rate of production), it will be seen that the comparative heating effect of the gas, as determined by these trials, is considerably higher than that assumed when making the calculations given above. Since this trial was made Messrs. Leoni have tested the apparatus in all sorts of ways, and in every case with pretty much the same result. Not the slightest difficulty has ever been experienced in using the freshly prepared gas direct from the producer, without the intervention of a gasholder or pressure regulator of any kind. This is justly looked upon as a very important point, especially as regards the application of the gas in large towns, where gasholders would be often inadmissible, and the introduction of pressure regulators even, might, in some cases, be attended by considerable inconvenience. We are now, however, in a position to state positively that such adjuncts can, in the case of large establishments, be entirely dispensed with, and that the gas may, for cooking and heating purposes, be directly applied.

Experiments of a somewhat similar kind to those detailed above were made on soldiers' cooking apparatus at Wellington Barracks. As, however, the results were in both cases almost identical, it will be unnecessary for me to enter into a long description of them. I will, therefore confine myself to one experiment. In one of the cook houses there is a large Dean's roasting and baking oven—internal measurement, 4 feet × 2 feet × 2 feet=16 cubic feet content. To this oven it was decided to apply the gas. For this purpose it became necessary to devise a special burner, as the oven is arranged for burning solid fuel. The burner employed was made in the form of a cross, each arm having in its upper side a circular opening two inches in diameter for the exit of the gas. This was placed in the fire place, and connected with the generator by a three-inch main, and the whole of the gas produced by a No. 1 generator burnt in it. The flame from the burning gas did not impinge directly on the flat iron bottom of the oven, but upon the invert of a flat arch of fire brick four inches thick closely applied to it, and forming the crown of the furnace. This arch and brick lining of the fire-place were raised to a bright red heat in about 45 minutes after lighting the gas. The temperatures attained by the oven were as follows:

30 minutes	after	lighting,	temperature,	235° F.
45	"	"	"	336° F.
60	"	"	"	450° F.
75	"	"	"	523° F.

Before making this trial, the oven had been lying neglected for some months, as it was considered by the cooks to be a particularly badly constructed one, in which, on account of the sluggish draught, they were unable to either bake or roast properly. They were not, it is true, very sanguine of our being able to do with gas what they had failed to accomplish with solid fuel, and were at first rather inclined to shake their heads and smile incredulously. The result, therefore, took them completely by surprise. They have a rough and ready method of ascertaining approximately the tempererature of the interior of their ovens by touching the iron nobs on the doors. Just before the close of the trial they came one after the other and applied this test—which to them was a much more satisfactory one than the indications of a thermometer—and they declared that if they had fired the oven in the ordinary way for a whole day it would not have been so hot. Even with the best constructed ovens it takes them from two to two and a-half hours to get up the same heat that we reached in a little over an hour, and that, too, with a much greater consumption of fuel. Thus, the No. 1 generator used in this trial consumes from 10 to 12 lbs. of coal an hour. Their furnaces, as near as one could ascertain, burn from 15 to 18 lbs. of coal an hour; consequently we did with from 12 to 15 lbs. of coal in 75 minutes, what it takes them 120 to 130 minutes to do with from 30 to 40 lbs. of coal.

The most eminent metallurgists and engineers have long maintained that the most perfect kind of fuel, for either manufacturing or engineering purposes, is gas. It will be quite useless, therefore, for me to stop to insist upon this point, or do more than just indicate some of the advantages that have been claimed for this kind of fuel. Briefly, these are as follows:

1. Saving of fuel, less being required to do a given amount of work.

2. Increase of work done in a furnace of given dimensions, being the result of the great calorific power at command.

3. Complete command over the heat of the furnace.

4. Perfect uniformity of heat throughout the furnace, and greater durability of brickwork, owing to the absence of ashes, by which the fusibility of the surfaces with which they come in contact is much increased.

5. The production of a flame of such purity as to diminish materially the waste by oxidation and deterioration of the metals, etc., operated on.

6. Increased command of the heat employed, and of the chemical effects produced by the flame, which can be immediately checked when required, or at once changed from an oxidising to a reducing one, or *vice versa*.

7. Great cleanliness.

8. Absence of smoke and soot, which, in the neighborhood of large towns, is of great importance.

These admirable qualities have led to the adoption of this kind of fuel in a number of works, and for a variety of purposes. The great bar that has hitherto prevented it from being much more extensively used is, as before-mentioned, the cost and size of the generator and its appendages. It is, however, believed that now a simple means has been discovered of producing a richer heating gas than that hitherto employed, and in any quantity at pleasure, either large or small, to suit the special purposes for which it is required, that its well-known and manifold advantages will ultimately result in its being almost universally adopted in small as well as large works to the exclusion of the grosser forms of fuel; and that it is only necessary to make the existence of this apparatus more widely known to insure a steady and increasing demand for it.

A series of experiments have been made, with the view of showing the applicability of this gas to the heating of furnaces for metallurgical and other processes. Of course, no experiments were needed to prove that in a properly-constructed furnace a very high temperature could be obtained by the use of gaseous fuel, as that point has long been set at rest by Siemens and others. But it was necessary to show to intended consumers that our gas could be utilised in this way, and that in a furnace of corresponding dimensions as high a temperature could be attained by the consumption of the gas produced by this small generator—burning on an average 10 lbs. of fuel an hour—as by a large apparatus consuming from two to three tons of coal a day, and that, too—if possible—without the use of those large, brick, regenerative chambers, which are so costly an adjunct to the larger apparatus.

With this view we had constructed a small furnace, to which was applied the gas from a No. 1 generator. I shall not trouble you with the details of this furnace, as it was so obviously defective in many respects that to describe in its present form would be useless. Suffice it to say, notwithstanding these defects, by means of an extremely simple accumulating and reversing arrangement, a temperature of from 2,000 F. to 3,000°F. was readily attained in it, and cast-iron melted in a few minutes.

This result is so far satisfactory, but it falls very far short of what can, and will be, attained with an improved construction of furnace. On this point, however, further experiments are much needed, in order to put this very important matter beyond the possibility of a doubt; but such experiments, I need hardly point out, require time and means.

As regards the application of the gas for steam boiler purposes, comparatively few experiments have been made, and those only of a very rough description; the results, however, tend to show that, with better modes of applying the gas, and with the experience gained in these trials to guide us, very much better things may be expected from any future trials.

In some experiments made at Woolwich Arsenal on a small boiler in the chemical laboratory, we succeeded in getting a considerably greater evaporative effect per lb. of fuel consumed, than was obtained when the same boiler was stoked in the ordinary way.

Of course, in making such experiments as these, it has always to be borne in mind that the apparatus under trial must be adapted to the boiler, and not the boiler to the apparatus. This is the principle on which the experiments at the arsenal were conducted, and I must confess my opinion now is that, in tying ourselves down too rigidly to this rule, we committed a grave error. For it is obvious that it is next to impossible to obtain anything like the full calorific power of gaseous fuel by attempting to burn it—almost without preparation of any kind—in the large ill-constructed furnaces in which so much solid fuel is now wasted in our boilers.

However, as I said just now, we gained valuable experience from those trials, and the result was far from being an unsatisfactory one, notwithstanding the crude way in which gas was applied.

If, in future, we should be in a position to undertake fresh experiments in this direction, and a judicious combination of the experience thus gained be effected with another well-known experimental fact, viz., that in a combustion chamber, if the walls be persistently kept far below the temperature at which combination of oxygen and hydrogen, or oxygen and carbon takes place, the re-

sulting combustion must of necessity be imperfect. I have no doubt a far different result will be obtained, and the immense superiority of gaseous over solid fuel, for boiler purposes, be most completely demonstrated.

Respecting the use of the gas for illuminating purposes, I have not much to add. We have seen that, as it comes from the producer, it is essentially a non-luminous gas. Attempts have been made, during the process of manufacture, to convert it into a permanent illuminating gas, by throwing into it the necessary proportion of carbon; as yet, however, these attempts have only been partially successful.

Of course, the gas can be carburetted in the same way as common air, by passing it through a peculiarly constructed vessel termed a carburetter, containing the highly volatile distillate from petroleum known as gasoline. Under these circumstances, it takes up a quantity of the hydrocarbon vapor, and becomes transformed into a luminous gas of considerable power. With the special burner recommended for use with this gas, as high an illuminating power as 19 Parliamentary sperm candles has been obtained, and an average light of from 15 to 16 candles, with a consumption of about 5 cubic feet of the carburetted gas per hour. I have here a small carburetter, containing gasoline, and connected with it is one of the special Argand burners. I will pass some of the gas from this holder through the vessel, and show you the flame of the carburetted gas; and in order that you may form a better estimate of the change effected in the gas by this process, I will again light the simple bent tube burner we employed just now. This, as you see, is connected with the gas holder direct, and not with the carburetter. Both burners are now in action, and you can judge of the effect produced on the gas by mixing with it the vapor of the volatile hydro-carbon.

It will, perhaps, be as well to state here, that this carburetting process forms no essential part of the principle of the apparatus I have described; it is only looked upon as a useful adjunct in places where coal gas cannot be readily obtained, and it is not intended for one moment to compete with the latter for illuminating purposes.

When it is intended to carburet the gas, and to employ it as a source of light as well as heat, it becomes absolutely necessary to use a gasholder, both to store the excess of gas made by the generator, and also to equalise the pressure, which in the generator itself is liable to slight fluctuations, of no consequence whatever when the gas is simply used as a source of heat, but highly objectionable when it is employed for lighting also.

DISCUSSION.

Mr. Hale said he had not quite understood the comparative expense of this gas and the ordinary gas, and doubted whether it would be wise to have two sources of gas laid on for domestic purposes.

Mr. Davies said the cost of this gas was about 5s. 3d. for 10,000 feet in the small generator, but when a larger generator was used 7s. 10d. for 35,000 cubic feet, or about 3d. per 1,000. This was equivalent in heating power to about 7,000 feet of ordinary London gas, costing from 24s. 6d. to 28s. It was not supposed that this apparatus could be introduced into every small household; but it was rather intended for large country establishments, where ordinary gas could not be readily obtained, and also in manufactories and places where a clean fuel, free from dirt, ashes, and sulphurous compounds, was required. In reply to another question, as to whether this gas was explosive, he said that all gases were explosive when mixed with oxygen in certain quantities; but owing to the large percentage of nitrogen, this was very little explosive. In fact, he had at times found considerable difficulty in making it explode when mixed with pure oxygen and an electric spark passed through it.

Sir Francis Knowles, Bart., F.R.S., said that some time ago he was kindly allowed by the proprietors of this invention to inspect their works at Battersea, where he was much struck with the extreme cleanliness and simplicity of the invention, but there was one element on which he must offer Mr. Davies his condolence, namely, the large quantity of nitrogen, which must considerably reduce the temperature of combustion, and, therefore, the effective heat of the fuel. If they could succeed in getting rid of that, and he saw no reason why they could not, the temperature would be much increased. He did not know whether Mr. Davies had calculated the temperature of combustion.

Mr. Davies said he had not.

Sir Francis Knowles said that was a most important element. If to boiling water you added an equal quantity of cold water, you would only obtain a heat much below the mean of the two temperatures, and the introduction of this nitrogen, which was inevitable, it appeared, at present, in consequence of the combustion of fuel necessary to vaporize the water, would act in the same way as cold water, and must, of course, very much deteriorate the value of the fuel. This use of water gas was by no means novel, the only novelty being the form of the apparatus. Some years ago the proprietors of large iron works in the North endeavored to apply this gas in their blast furnace. They collected a large quantity of it in a gasholder, their idea being that it would save fuel by blowing it through the tuyeres in combination with the ordinary blast. On recently writing to ask the result, the answer was that unfortunately, after they had worked it a short time ago, with no particular advantage, owing to the neglect of a little urchin entrusted with an important function in the process, the whole affair disappeared into space, and unfortunately the little urchin disappeared with it. But he had obtained an analysis which very much differed from that now given. Mr. Davies had only given the analysis by volume, and he regretted he had not given it by weight also. The analyses he referred to was as follows: —H 56; CO 29; CO_2 15·80; Light Carb. Hyd. ·3, so that the nitrogen was entirely absent. He did not exactly know the process by which it was manufactured, but it was so arranged as to exclude the nitrogen, and he thought it would be well worth the while of Mr. Davies and his allies to turn their attention to that point. In other respects it appeared to him a highly useful application—more particularly for domestic uses, for he considered it would be limited to that rather than being applicable on anything like a large scale in manufacturing; because in comparison with the heating power of fuel it would be found that the heating power was not so great. At the same time he did not at all wish to find fault with the invention, but simply speaking the truth in the interest of science to point out where the imperfections lay. He should like to see a bit of platinum wire placed in the flame to test its heating power.

[This being done, the platinum wire was heated to a bright red.]

Sir Francis Knowles said had it not been for the presence of nitrogen the wire would have been of a dazzling white. At the request of a gentleman in the room, he repeated the analysis above given, and added the analysis by weight: namely—H 10·51; CO 51·59; CO_2 33·26; Light Carb. Hyd. ·63. He would also say that in all these gases which ought properly to be called wet gases—gases containing hydrogen, particularly when burnt with common air, you had a great loss of heat; owing to the generation of aqueous vapors in the products of combustion, the specific heat of aqueous vapor was very high, indeed, about ·836, so that, in fact, it robbed you of very nearly all the heat you were generating. There was an enormous quantity also of nitrogen imported in the process of burning this hydrogen. For every pound of hydrogen you burnt you had to introduce eight pounds of oxygen, and for every 23 pounds of oxygen you had to introduce 79 of nitrogen, all of which you had with the aqueous vapor to raise for final temperature of combustion, and when you came to distribute in a sort of quasi-partnership all the heat you had, you were robbed of a great quantity of what should be effective heat by that carried off by these products of combustion. It would be found that all wet gases, as he might call them, produced very much less effective heat than what might be called, in comparison, dry gases, namely, those into which no aqueous vapor entered. There was the advantage in this gas that you would not have any very great quantity of sulphur, and what there was, was not in a prejudicial form. He would take another opportunity of calculating the usual temperature of combustion, and send it to the *Journal*. As far as he could understand the apparatus, it seemed to him perfectly protected from anything like explosion; and there was not much danger of asphyxiation, which was another important point. He should also like to know whether Mr. Davies had ever tried an experiment in a grate full of asbestos.

Mr. Davies said he had tried it, but not in a very complete form, or in such way as he should care to describe.

Mr. T. W. Hartley said he had been a great deal connected with the manufacture of water gas, but he differed from Sir Francis Knowles as to the necessary qualities of such gases containing H, CO, and CO_2, because it was possible to resolve most of the CO_2 formed by the first combustion into CO, thereby obtaining as much heating power as you would from hydrogen; in fact, more simply, because you had in CO what he designated a dry gas. Nevertheless, in spite of the advantages which the gas seemed to possess, it was a fact that, as compared with these gases, which contained hydrocarbons, gases from water were inferior in heating power; and if this were so, it must necessarily be much more so with gases containing from 56 to 57 per cent. of nitrogen, which was inert, and quite useless for the puapose of heating; and in fact more than useless, because it absolutely prevented the flame obtaining the temperature necessary to give the best result. Some two years ago he saw Mr. Kidd's process in operation, and was much struck wit it, believing that for smelting purposes on a large scale he had effected a very important invention, and thereby rendered a great service to the world; but he could not follow him into the conclusion that this gas could compete successfully with the gas obtained from the ordinary gas companies for the purpose of heating or lighting. With regard to heating, they were told already that it required something like five volumes of this to produce the same effect as one of ordinary coal gas. He was quite prepared to believe that it would require even more than that, but supposing it took only that, there would still remain the question

of the cost of production; and he must say he was considerably started by the statement that a thousand cubic feet of gas were produced from 10 lbs. of fuel. If the nitrogen were left out of the question, it came to something like 43 feet per lb. of fuel employed to produce CO, H, and CO_2, and that he was hardly prepared to receive readily, knowing as he did that in the production of water gas, though theory taught that you ought to get from a pound of carbon over 2,000 cubic feet, practice indicated quite a different thing. In America, where they had been trying this a good deal, it was found that in order to produce 1,000 cubic feet of hydrogen gas, they were obliged to employ 70 lbs. of fuel, the fuel being very analogous to the anthracite here employed. He was also startled by another statement, viz., that following an elevation of pressure within the tube you got an increased volume. He was not surprised at that in one sense, for the simple reason that by increased pressure you might increase the outward pressure through the pipe, and thereby add materially to the quantity of nitrogen, but he could not follow the tables showing the analysis of the gas obtained with different pressures. The difficulty he felt was to understand how the increased pressure could produce more perfect combustion, and thus a larger quantity of CO_2. It seemed to him the apparatus wanted greater depth to produce the best effects from the decomposition of the fuel, because experience had taught him that for the best results in the decomposition of steam you must have a tall column of carbon for it to pass through. The first impact converted the oxygen of water into CO_2, which by passing through a large mass of incandescent carbon took up another atom of carbon and became converted into CO.

Sir Francis Knowles said he might give a simple illustration of the importance of excluding the nitrogen. They all knew that the oxy-hydrogen blowpipe gave almost the highest temperature known, which would melt platinum, but if you attempted to burn the same gas with atmospheric air, you could only melt some of the more fusible metals. He would also suggest that nothing would be easier than to get rid of the CO_2 altogether, by passing the whole gas through a second retort. Then if you got rid of the nitrogen also you would have a gas of very considerable heating power.

Major Webber, R.E., said many interesting suggestions had been made, but those who were carrying on the process had for the last two years been almost overwhelmed by suggestions, nearly all of which had been experimented on. It was very natural that when a simple apparatus of this kind had been made and tried, and its results analysed, suggestions which involved altering the process to a great extent could not be carried far. The object of perfecting the invention of Mr. Kidd, which two years ago was in a very crude and imperfect form, had been to make the apparatus produce the best gas it was capable of producing, chiefly with the object of utilising anthracite coal. There was no doubt the gas was at present not perfect, but experiments had been made in the direction pointed out, and if they could be carried out on a larger scale he had no doubt better results could be produced. It was very easy to reduce the amount of nitrogen; you had only to use two or three generators, working them alternately, to produce from one or other of them continuously a gas in which the nitrogen would be reduced to from 12 to 15 per cent.; and the value of the interior gas allowed to escape from one generator while the superior gas was being produced in the other was so small as hardly to effect the cost of the whole. With regard to the suggestion that a greater depth of fuel was necessary, the answer was very simple, that so long as the depth was sufficient to change the CO_2 into CO, leaving only the small amount which the analysis showed, that was all that was required. They had found by experiment that the depth here shown was as nearly as possible the best.

Mr. Gore, having had considerable experience in the generation of water gas, felt considerable interest in the question; but he fully concurred in the great defect of using gas for heating purposes, in which a large amount of watery vapor was produced. There was another important matter, and that was the large proportion of CO. He really thought the poisonous character of that gas, especially when used for domestic purposes, had not been sufficiently considered. His own impression was that the adoption of any system whereby CO was to be used for domestic purposes, was so dangerous as to interfere with its practicability. Experiments had been lately going on in America with regard to it, and readers of the *Scientific American* would, he thought, come to the conclusion that any form of using CO must be dangerous, and that, whatever might be done with it for manufacturing purposes, it should be avoided in households. He was convinced that ordinary coal gas was the most useful fuel which could be obtained; but then came the question whether the substitution of gaseous for solid fuel was not a step in the wrong direction, but as that was not the subject of discussion he would not go into it.

Mr. Kenelly said no doubt they ought to pay considerable deference to any information which came from America, but still he thought they were capable of taking care of themselves. As to the use of gaseous fuel, he thought it was a thing they were gradually coming to. After referring to the statements made by Mr. Davies as to the relative cost of common coal gas, and that thus produced, he said if these facts were really so, it was a startling thing, and it was nonsense bringing forward theoretical considerations in opposition to them. Whether there were a large amount of nitrogen or a small amount of CO_2, if the same effect could be produced from that which cost ¾d. as from 10d. worth of ordinary gas, and that seemed to be the result, there was something very valuable in the process. As to the question of danger, he happened to look into Mr. Leoni's establishment in the Strand a short time ago, and saw one of these apparatus at work in the basement. He did not know whether the sanitary authorities or the police were informed of it, but he saw no one looking very unhealthy or unhappy in consequence.

Mr. Brontin said he had been long connected with Wales, and, as President of the South Wales engineers, had had his attention much directed to the question of burning anthracite in an easy form. He believed that was now accomplished, and he would direct Mr. Davies's attention to the fact that a very simple apparatus, very much on the principle now shown, had been adapted to burn it perfectly, and was applicable to almost any boiler. It consisted in the use of a steam jet thrown into a hollow bar perforated with holes, through which the steam escaped, and thus formed the gas of which the analysis had been given. It enabled large and small coal to be used, and there was no raking of the fire or anything of the kind. He had just gone into the question very roughly as to the quantity of heat thrown out by the gas as compared with the ordinary use of coal under a boiler, and he found that the quantity of heat in the case of gas was 627, as against anthracite at 795, so that there would be a disadvantage in the use of coal gas as compared with coal, were it not that he had always found, both in locomotives and under ordinary boilers, there was a large amount of air admitted, which had a considerable cooling effect, so that you did not get the absolute result from the burning of the coal. He had had a large experience in using gas with blast furnaces, and they found it impossible to do so, without having a combustion chamber first, and allowing the products of combustion to pass through that which was required to be heated. The nitrogen would take up a certain amount of heat and carry it with it, and by using a Siemens' accumulator you could utilise that to any extent, so as really not to lose any of the elements of heat. Coupling that with the suggestion which has been made as to the conversion of CO_2 into CO again, he thought the process was one which was worthy of very serious attention. He felt quite certain that the march of intellect would lead them to pay less carriage on coal, because conveying gas would be much more simple. When they talked about bringing water from the north of England to London, he did not see why they should not in a lesser degree simplify costly transport by these means. No doubt Sir Francis Knowles knew the "black band" seam; it contained a large amount of carbonaceous matter, and just to test the power of the apparatus they had put it on the boiler fire, and burned out all the carbonaceous matter, leaving the "black band" on the bars, which remained untouched. That showed the great power of the apparatus very forcibly.

Mr. Hartley said there was great difference in using gases immediately it was generated from a furnace in a state of ignition, and allowing them to cool, and then igniting them afterwards.

Mr. Davies, in reply, said one speaker had so far answered the remarks of another that there was really very little left for him to say. With regard to the danger of CO, you might say every gas was dangerous. Marsh gas and olefiant gas were extremely explosive, but we were not afraid of admitting them into our houses, and, on the same principle, he did not think there was any danger of being poisoned with carbonic oxide. With regard to the great quantity of nitrogen, they knew, of course, that it only acted as a diluent, and carried off heat. But he had shown what could be done with this gas as it stood; he had compared it with coal gas, and the experiments he had mentioned showed that, notwithstanding the nitrogen, a great heating effect could be produced from it, and at a much less cost than with ordinary coal gas.

The Chairman said there could be no doubt that if the cost of the gas was what had been stated, it introduced a very important source of economy into domestic arrangements. The advantage of using gas in our houses for the purpose of combustion was one of which there could be no doubt, provided the element of cost could be successfully met. A gas fire was so easily regulated, and so convenient in application, that it certainly appeared to him to be a more civilized arrangement than that of burning raw fuel. No doubt there were certain questions connected with this gas which, if solved, would probably increase its heating power very considerably, but apart from that they might look upon this as a great advance in the system of heating, and he was sure they would all concur in passing a vote of thanks to Mr. Davies for the exceedingly clear way in which he had brought it before them.—*Jour. Soc. Arts*, April 12th.

THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY

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MONDAY, JUNE 17, 1878.

Official Report of Examinations of Gas for two Weeks ending June 8, 1878, made at the Photometrical Room of the Department of Public Works.

Corrected Illuminating Power.

Date. May, 1878.	Time of Day at which Test were made.	New York Gas-Light Co.	Manhattan Gas-Light Co.	Mutual Gas-Light Co.	Metropolitan Gas-Light Co.	Harlem Gas-Light Co.	Municipal Gas-Light Co.
27		15.94	17.40	17.65	15.93	17.43	
28	Between	16.38	16.70	18.52	16.52	16.77	
29	10 A. M.	15.54	16.79	17.85	16.72	16.85	
	and						
31	3 P. M.	15.94	16.52	20.33	16.57	17.11	
June 1		15.96	16.37	18.72	16.90	17.00	
	Average	15.95	16.75	18.61	16.52	17.03	
3		16.54	17.20	18.86	17.95	17.04	
4		17.43	16.60	18.98	17.22	17.23	
5		16.48	16.38	18.46	16.40	16.27	
6		16.20	16.80	18.02	17.29	16.17	
7		15.67	16.98	19.46	17.00	16.42	
8		16.90	16.98	19.78	16.37	16.79	
	Average	16.53	16.82	18.92	17.04	16.65	

Sugg-Letheby burner.
E. G. LOVE, Gas Examiner.

Fuel in Utah.—Utah has a plentiful supply of fuel, yet the product of the coal mines for 1877 was only 10,000 tons. About 1000 tons of coke was made from native coal. There was 47,100 tons received from Wyoming Territory, and 10,680 tons of coke from Pennsylvania. Capital is needed to develop local coal mines.—*Saward's Coal Trade Journal.*

[From the Brooklyn "Daily Eagle," June 3.]

The Gas Question in Brooklyn.

A LUCID EXHIBITION OF THE GAS PROBLEM IN BROOKLYN

Mayor Howell has vetoed both of the resolutions adopted by the Alderman looking to the use of naphtha gas for lighting the streets of Brooklyn. As against the resolutions themselves, the Mayor's argument is overwhelming and unanswerable. The Mayor opens up a wide field of discussion in his forcible comments on the policy which has prevailed in this city, in the management of the gas business in the past. The gas companies will doubtless wince under the severe excoriating they receive at the hands of the Mayor, but by following his advice we have no doubt Brooklyn would have cheaper gas, while gas stockholders would be none the worse for it in the long run. Brooklyn must have cheaper gas, and that she may have it, the business of manufacturing gas must be concentrated and made more economical in Brookyln. When the gas companies supply ges at a fair price, no householder can afford to use any other light, and when this shall be made true, the gas business will be profitable in Brooklyn, and it will never be before.

The following is the text of Mayor Howell's veto of the Aldermanic resolution awarding to the New York and New Jersey Globe Gas-Light Company a contract for lighting with naphtha gas the district now covered by the Williamsburgh Company:

MAYOR'S OFFICE, CITY HALL,
BROOKLYN, June 1, 1878.

To the Honorable the Common Council:

Gentlemen: I have decided to withhold my approval from the resolution adopted by your honorable body on the 20th of May, 1878, directing that a contract be entered into with the New Nork and New Jersey Globe Gas-Light Company, to furnish naphtha gas for the street lamps now lighted by the Williamsburgh Gas-Light Company. I have reached this conclusion for these reasons: In abandoning the use of coal gas for the purpose of lighting our street lamps we are going backward, and are abandoning to this extent one of the most useful of modern discoveries. I regard the use of naphtha for street lighting as an experiment to a very great extent, and an experiment with a material exceptionally inflammable and destructive. I am satisfied the use will throw a shadow of danger over property and life throughout one entire section of the city. I am bound to protect that section from an invidious distinction against it, while the advantage, if any, will be shared in by the city at large. Again, under the action taken there has been no competition for naphtha gas. The Globe Company offers to light each lamp in the Eastern District at the rate of twenty-three dollars per annum. The same service is performed, I believe, by the same company in an outlying district of New York for fifteen dollars per lamp, and I am reliably informed that the material can be supplied at twelue dollars per lamp, with a reasonable profit to those furnishing it. These facts alone would be conclusive to my mind against the right of the resolution to escape my official interference. Now, permit me to say that I share fully with my fellow citizens and, doubtless, with your honorable body, in the feelings of opposition and just resentment which the persistent exactions of the gas companies of this city have provoked. A very vivid illustration of the strength of those feelings is presented by the fact that we are now under the necessity of considering the abandonment of coal gas for street lighting purposes, because we cannot obtain gas on fair terms from the companies chartered by the city to supply what is, or what ought to be, the safest, the most convenient, and the most economical article for furnishing light for our homes and for our public thoroughfares. I am not at present prepared to say that if the gas companies of this city continue the

FOOLISH AND SELFISH POLICY

which has, in my judgment, characterized the conduct of their business for so many years, it will be but our duty to accept some inconvenience and possibly some risks, to prove to those companies that the municipal corporation, to which they are indebted for their existence, will not suffer them to wrong it and the citizens at large with impunity, and without resistance and retaliation. But the element of injustice which enters into our complaints against the gas companies would characterize the contract you propose to make with the naphtha company, in giving it a contract for lighting the street lamps of the Eastern District of this city. If it is desirable to light any of our streets with any material other than coal gas, we should provide for the widest competition. Under the proposed contract the Globe Company had, except in so far as the Williamsburgh Gas-Light Company is concerned, as complete and practical an absence of competition as the Williamsburgh Company had in bidding against other companies when it was not practicable for any other gas company to compete with it, because of the way the gas companies have divided up the city among themselves, to insure each other against the very competition a multiplicity of gas companies seems to be designed to provide.

The gas companies, by what I regard as their avaricious folly, have driven thousands and thousands of our citizens to abandon the use of coal gas, because they were satisfied that they were not being supplied with gas at fair prices, and because they were habitually treated with unbusiness like discourtesy. I am not prepared to say that the time will not come when the city will have to follow the example of so many citizens, abandon the use of gas, and accept inconvenience, discomfort, and danger, rather than submit to unjust exactions, and to rude business dealings. I am willing to give the gas companies one more opportunity of meeting the difficulty in which they have placed themselves—especially when by doing otherwise, as in the present instance, we will be obliged to place one section of the city at a disadvantage with another, and subject to the danger of fires which those most directly interested in averting—the insurance companies—have protested very earnestly against before me. It has been represented to me by the agents of the gas companies that the business of manufacturing gas in Brooklyn is at present unprosperous, and that the companies are, nevertheless, called upon to pay a considerable amount to the city in the shape of direct taxation. The

DEPRECIATIOE OF GAS PROPERTY

at this time is no argument in favor of the continuance of the present gas policy. It is an argument against it. I am satisfied that gas can now be supplied to consumers at such a price that no householder or storekeeper could afford to use any substitute for gas. The gas business needs to be reorganized in Brooklyn. There is more capital apparently invested in it than is needed to conduct it. There are more companies in existence here than are compatible with a close and economic conduct of the gas business. Brooklyn does not get any return in taxes that begins to offset the loss our citizens, who are gas consumers, suffer by a wasteful conduct of this business. Our city does not need more gas companies—it requires fewer. Enough is known of the management of the business of manufacturing and supplying coal gas in Brooklyn, to cause just discontent. Enough is withheld to increase it.

If the gas companies will convince the public that the capital they have invested in their business is no more than is needed for its conduct, neither the city nor the private consumers will begrudge them a fair and even a generous dividend on their capital. The mystery surrounding the conduct of this business, and the anomaly involved in the fact that there are no less than six gas companies in Brooklyn, while each of them has a practical monopoly over the several districts they have parceled out among themselves, have naturally produced discontent, and this has been followed by a desire to retaliate. This desire has taken a shape so effectual that a great decline in the

consumption of coal gas has followed; gas property has depreciated largely in value, until at last the companies have risked the loss of the largest and the most profitable of its customers—the city itself. The companies can retain the custom of the city by supplying it with gas as cheap as it is furnished to other cities similarly situated, and it can permanently retain that custom in no other way. Brooklyn has been compelled for years to pay more than it can afford for lighting its streets and public buildings, and more than is fair. This item of expenditure amounts to nearly half as much as the cost of supporting our local public school system, and to about as much as is spent in maintaining the department of public charities, under a system more wasteful than the taxpayers are disposed to tolerate. At the rates now charged to New York city for its gas, Brooklyn would not be called upon to expend much more than half what it now pays for gas, and there is no good and no honest reason why the cost price of this article should not be about equal in the two cities. But I am

NOT WILLING TO ACCEPT A MONOPOLY

in one illuminating material for a monopoly in another, which is less desirable, and in the use of which the element of danger enters. Under the contract you favor the difference between the cost of lighting the street lamps with naphtha and coal gas is not great enough to justify the use of the more objectionable and less desirable article. I am, however, glad to say that your action has been attended with one good result. It has doubtless been the means of inducing the gas companies to submit to me a lower bid than that which was before you when you decided in favor of using naphtha gas in the Eastern District.

This practical admission of unfairness in the past, has not to any extent influenced my action in vetoing your resolution. I am governed in doing so by these facts: The use of naphtha is an experiment; it is not desirable to encourage its use or its presence in a large and populous community; the price you propose to pay for it is far more than it is worth; it is invidious and unfair to provide for its use solely in a section of the city which is exceptional in nothing except that it may be the more convenient for the business purposes of the company which proposes to supply naphtha for street lighting purposes.

Permit me to remind your honorable body that the contract you are still discussing was properly open for your consideration on the first of January last. Action on it has been delayed for five months. Any contract you may now make with the gas companies will have but a little over half a year to run. I would respectfully suggest to your honorable body that you should offer to the gas companies a contract for lighting the street lamps, for the balance of the year, at a round sum, which shall include lighting the lamps, keeping them clean and in repair. The average price paid by New York per lamp for this service should be a fair price in Brooklyn, and this I am assured is very nearly thirty per cent. less than is now charged in this city. If this offer is not accepted by the companies, I recommend that a contract be entered into with them in the usual way—on the modified terms offered through my office and to me. I herewith submit these amended and raduced bids for your consideration. The reduction is about twelve per cent. on the former bid. This perhaps is about the best we can do at present, and for the balance of the current year.

I will be glad to co-operate with your honorable body in any policy you may initiate meanwhile to the end

A WARNING TO THE GAS COMPANIES

If by January next the Brooklyn Gas-Light Companies are not prepared to light our street lamps, and to supply our public buildings as cheaply as our sister city New York obtain such services, then Brooklyn will make the attempt to provide for lighting its streets and public buildings in its own way, and independent of the existing gas companies.

From the best information at my disposal I am led to the conclusion that twenty dollars per lamp a year is a fair price, and that in consideration of the fact that the city is a large customer, this price should include the cost of lighting, cleaning and repairing the street lamps.

The position I have taken in what I have hereinbefore written, compels me to veto another resolution adopted by your honorable body, relating to this subject.

I accordingly notify you of my official disapproval of the resolution adopted by your Honorable Board May 20, 1878, providing that bids be re-advertised for, for lighting the street lamps in the districts in which the streets are now lighted by the Brooklyn, Citizens', Nassau, People's and Metropolitan companies respectively. Any resolution of this character, passed by your honorable body should, as the case now stands, embrace the districts supplied by the Williamsburgh Gas-Light Company, in view of my dissent to make that district exceptional by sanctioning the use of naphtha gas for lighting the streets embraced in it, while in the other districts the question is left at all events an open one. Respectfully,

JAMES HOWELL, Mayor.

WHAT THE GAS COMPANIES PROPOSE TO DO.

The following correspondence accompanied the veto message:

BROOKLYN, May 20, 1878.

Hon. James Howell,

Mayor of the City of Brooklyn:

Dear Sir: Realizing your desire to reduce the expenses of this city, and being desirous of seconding your efforts in this direction, we the undersigned representatives of four of the Gas-Light Companies of the Western District, beg leave to so modify our last proposition so as to make the price for the gas furnished to the public lamps and public buildings at the rate of $2 per one thousand cubic feet, in place of $2 15 per one thousand cubic feet, as therein proposed, for the unexpired portion of the year, commencing on the 1st day of May, and ending on the 31st day of December, 1878.

At the above price the cost per lamp would be $18-23, including lighting and extinguishing and cleaning and repairing. Respectfully,

JAMES H. STEBBINS,
President of Citizens' Company.
EDWIN LUDLAM,
President of People's Company,
H. P. MORGAN,
President of Nassau Company,
JOHN WILLIAMS,
President of Metropolitan Company.

FROM THE WILLIAMSBURGH COMPANY.

BROOKLYN, May 29, 1878.

To the Honorable James Howell, Esq.,

Mayor of the City of Brooklyn:

Dear Sir: I am directed to state to you that the Williamsburgh Gas-Light Company will furnish gas to the street lamps in the district occupied by their pipes, from the 1st of May, 1878, to January 1, 1879, at the rate of $20 per annum. Will light and extinguish the same at one cent per night per lamp, will clean and repair the same at twenty-two cents per lamp per month, also, will furnish gas for the public buildings in their district for the same period of time at $2 per one thousand cubic feet.

The Williamsburgh Gas-Light Company.
By (per order),
C. F. BLODGET, Secretary.

FROM THE BROOKLYN COMPANY.

BROOKLYN, May 31, 1878.

Hon. James Howell, Mayor:

Dear Sir: The Brooklyn Gas-Light Company hereby ask leave to amend their bid for supplying the city with gas from May 1, 1878, to January 1, 1879, and offer at the rate of $20 per annum for each lamp for gas consumed, which is at the rate of $1.82½ cents per thousand feet for gas, $20.

Lighting and extinguishing	$3.65
Cleaning and repairing	2.64
For lamp per year	$26.29

And for public buildings at the same rate per one thousand feet, viz., $1.82½ cents.

A. W. BENSON, President.

[From the "Detroit Free Press," May 28.]

Street Lighting Once More.

Somebody who professes to be anxious for "fair play," has distributed throughout the city a circular entitled "Street Lighting—New York vs. Detroit." The anxiety of the author for fair play is not strong enough, however, to induce him to affix his signature to the circular; and as the document is devoted exclusively to a plea for the use of illuminating gas in Detroit, at such prices as the manufacturers demand, and such incidental abuse of naphtha as the author deems necessary to bolster that plea, it may well be doubted whether the author has really any special desire for "fair play."

The circular referred to is carefully framed to avoid the appearance of being specially directed at facts heretofore set forth in THE FREE PRESS; but it is so clearly apparent that these facts are what the author had in his mind, and what drove him to the composition of his circular, that we make no apology for analyzing his effort and showing, as we propose to do, that it is a studied attempt to mislead the citizens and taxpayers of Detroit. To understand fairly the subject in controversy, it should be borne in mind that THE FREE PRESS has urged the throwing open of the whole street lighting to competition on the part of the naphtha companies, on the ground that only in that way can the gas companies be subjected to competition, as they have divided the city between them, and are practically pledged not to compete. To show that competition may reasonably be relied on to produce a reduction in price, we have shown the result in New York, where the larger portion of the city—all below Thirty fourth street—is to be lighted, so far as street lamps are concerned, for the year ending April 30, 1879, for $12 per lamp. The circular, as stated, is an elaborate effort to break the force of these facts. It begins with an admission that the statement of THE FREE PRESS in regard to the price paid for lighting street lamps is correct, but carefully avoids any reference to the very important fact that this price ($12 per post) includes lighting, cleaning and repairing. It then proceeds to show that the street lamp contract does not include the lamps in the public parks, and that the latter are contracted for specially at the same rate for eight months, as is paid for the street lamps for twelve. As the number of park lamps in Detroit is inconsiderable, it is not easy to see what bearing this has upon the comparison between the two cities; but the author of the circular seems to regard it as important, and we give the statement that he may have no excuse for claiming that he has been treated unfairly.

Following this is a statement which is either based upon gross ignorance, or is a willful attempt to mislead. The author of the circular says:

"Outside of the limited competing districts (which include, as we have shown, the whole of New York below Thirty-fourth street) the city pays very remunerative prices, noticeably to the Central Gas-Light Company, $45 per burner per annum, and to the Suburban Gas-Light Company $59 per post per year, and these are the rates fixed this year for those companies."

The impression sought to be conveyed here is, that in the districts supplied by the two companies named there is no competition, and that the companies put in proposals for the present year at the figures named, which were accepted. The author of the circular carefully avoids saying this, but it is what he intends the citizens of Detroit to understand. The facts are that the two companies named supply districts which were known before their annexation to New York as Morrisania and West Farms, and that the lighting is done by them at the prices named, in pursuance of contracts made in 1871 for ten years, by the town officers of those places. The rates, therefore, have not been "fixed this year for those companies," in any such sense as the author of the circular implies. And even if the facts were otherotherwise, the high prices paid for gas in these locali-

ties, where there is no competition, cannot be regarded as an argument against securing competition in Detroit. On the contrary, it would be regarded by most persons having the welfare of the city at heart, as a strong argument in favor of securing such competition.

The author of the circular is still less candid, if possible, in assuming that competition between bidders for gas and bidders for naphtha is impracticable, because the former are restricted by ordinance to supplying a certain quality of light, while the naphtha bidders are free from any restrictions. Here again the example of New York is of service. When proposals were advertised for in that city no difficulty was experienced in so framing the advertisement as to put gas bidders and naphtha bidders on terms of exact equality. The specifications upon the basis of which the bids were made provided, that if illuminating gas should be the material used, it should be of sixteen candle-power, and be burned in burners of a capacity to burn and actually burning three feet per hour. If any other material should be used, the specifications required that the quality of light produced should be equal to the quality (by photometrical test) produced by sixteen candle coal gas consumed in burners burning three feet per hour. The bidders for illuminating gas knew, therefore, precisely what they were bidding against, and the naphtha bidders knew just what they were required to do. There would be no difficulty whatever in so framing the specifications for lighting as to give the two kinds of bidders the same chance here. This disposes effectually of the specious pretense, presented in three or four different forms in the circular referred to, that there can be no honorable, equitable competition between all bidders in Detroit. There is no possible ground, indeed, for the making of such a pretense, except in the interest of the gas companies; and as these have done their best to deprive the citizens of Detroit of all the benefits derivable from honorable, equitable competition, they can scarcely be regarded as the best authorities on the subject of such competition.

As for the statement made in the circular that the use of naphtha lamps in Harlem (where a contract has been made for 500) has been strongly protested against by property holders, it may be true, though the general character of the circular and the fact that it is anonymous, make all its statements suspicious. But if the reference is to the protest made when the contract was signed, we have the authority of Mayor Ely, of New York, as reported in the New York *Herald* of May 5th, that it was made at the instigation of the Harlem Gas-Light Company. This is easy to believe in view of the fact that all the complaint and protest against naphtha in this comes from a similar source. The sum of the whole matter is, that while nobody would choose the naphtha light in preference to the light from illuminating gas, it both could be had at the same price, there is a growing disposition all over the country to use the former when it can be obtained at a price appreciably lower than the latter. As an evidence of this it may be stated that the light has just been introduced into Williamsburgh, New York, and a contract made for lighting 3,148 street lamps with it. That the light it gives is perfectly satisfactory, hundreds of our citizens can testify from actual observation; and there is no doubt whatever that those who furnish it can be held to quite as rigid a responsibility, in respect to quantity and quality of light, as the gas companies ever have been or can be. In a word, there is no reason, short of a too tender regard for the gas companies, in respect to every street lamp in the city.

The "humiliation" of using naphtha is an invention of those who manufacture illuminating gas; and they will probably be ready with a similar charge against the electric light when that comes into use, as it shortly must. There is certainly no more humiliation in burning naphtha on the streets, where it is perfectly satisfactory and perfectly safe, than there is in using kerosene in our houses and factories where the safety, at least, is still undetermined. Yet there are hundreds of citizens who have cheerfully humiliated themselves in the manner last described—if it is humiliation—rather than pay the price charged for illuminating gas. If the gas companies will light the streets in these times, when economy is so imperatively necessary, for the same price that the naphtha bidders will, quantity and quality of light being the same, the former ought to have the contract. But if they will not, the taxpayers will submit cheerfully, if not joyfully, to any humiliation there may be in the naphtha light.

STREET LIGHTING.

NEW YORK VS. DETROIT.

Partial and garbled statements as to the lighting of the public lamps in New York city having been frequently published, which are calculated to deceive many readers; it seems well advised to publish the terms, conditions, etc., of the bids made by the several companies bidding, and some of the points in the contracts subsequently made between them and the city.

The following are the bids received and opened April 24, 1878, for one year from May 1st, 1878:

Company.	Gas.	Lamp-Post straightened.	Column releaded.	Column refitted.	Lamp removed.	Lamp reset.	New Lamp fitted up.
Manhattan.....	12 00	1 50	1 50	3 50	3 50	10	10
New York.....	12 00	1 50	1 50	3 50	3 50	10	10
Mutual.....	16 65	1	1	3	3	8	8
Municipal.....	20 00	1 50	1 50	3 50	3 50	10	10
Metropolitan.....	19 50	2	2	3	3	8	8
Harlem.....	21 00	3	3	4	4	10	10
Yonkers.....	33 00	1	1	2 50	1 50	8	8
N. Y. and N. J. Globe gas-light Company.....	20 00	1 50	1 50	3 50	3 50	10	8

We find the following official action was taken on these propositions:

"Mayor Ely, Comptroller Kelly and Commissioner Campbell, acting as a gas commission, met at the City Hall on Wednesday last, and opened proposals for furnishing all public lamps on the streets and avenues of the city with gas from May 1, 1878, to April 30, 1879."

It will be here observed that the phrase "public lamps," as employed, has reference to the "public lamps on the streets and avenues of the city" only.

On the following day, to say—

"On the 25th, the commission awarded the following contracts for furnishing gas to the city, from May 1, 1878, to April 30, 1879:

To New York Gas Company, all the lamps south of Grand street, at $12 each; Manhattan Gas Company, for all the lamps between Grand and Thirty-fourth streets, at $12; Metropolitan Gas Company for a portion of the lamps between Thirty-fourth and Seventy-ninth streets, at $10.50; New York Mutual Gas Company, for a portion of the lamps between Thirty-fourth and Seventy-ninth streets, $16.65; Harlem Gas Company, for the lamps between Seventy-ninth street and Harlem river, excepting 500 lamps awarded the New York and New Jersey Globe Gas Company, at $10; Yonkers Gas Company, for seventy-two lamps at Riverdale, in the Twenty-fourth ward, at $33; New York and New Jersey Globe Gas Company, for 500 lamps between Seventy-ninth street and Harlem river at $20."

(In reference to the Naphtha lamps in Harlem, it might be interesting to note that a monster petition, signed by many thousands of Harlem property holders was presented, protesting against the use of the Naphtha lamps, setting forth that it had depreciated the value of investments in property, reduced the rate of rents for the best class of tenements, and that it was fast depopulating the district of the better living class of citizens; and that the use of Naphtha lamps was limited to very sparsely peopled localities.)

To the New York and Manhattan Companies were awarded contracts for lighting street lamps in their respective territories as described. To the Metropolitan Company a portion of the street lamps in its district.

There is no competition between these companies as many suppose, but the New York Mutual Company competes more or less with each of them; hence we find that company awarded "a portion of the lamps" in the district of the Metropolitan Company, all perhaps that it could now reach with the street mains as laid, it being the lowest bidder in that district.

It is also of record that at the same meeting of this Gas Commission for the city of New York:

"Bids were also opened as follows, for lighting lamps on the public parks, from May 1 to December 31, 1878.

"New York Gas-Light Compmy, $12 per lamp; Metropolitan Gas-Light Company, $13; New York Mutual Gas-Light Company, $16.05; Harlem Gas-Light Company. $13.42."

Here it will be observed that the "public lamps" in the parks (a very large proportion of the "public lamps" in New York were subject to proposals for the current year, that is, the balance of it from May 1, to December 31, inclusive), and the bids were quite the same per post for eight months as for a full year on the street lamps, in some instances, exactly the same.

A somewhat similar confusion of the terms "for this year" (that is, the balance of it) and "for one year," occurs in all the published reports of the opening of proposals for suppiying the public demand for gas in the city of Brooklyn, that have reached here, except one which reads as follows:

THE GAS PROPOSALS IN BROOKLYN.—The Board of City Works to-day opened and announced the following bids for lighting the streets and public buildings for the remaining eight months of the year:

Brooklyn Gas-Light Company—$18.25 per street lamp. Public buildings, $2 per 1000 cubic feet.

People's—$19 per lamp. Public buildings, $2.15.

Citizen's—$19 per lamp. Public buildings, $2.15.

Nassau—$19 per lamp. Public buildings. $2.15.

Metropolitan—$19 per lamp. Public buildings, $2.15.

Williamsburg—$19 per lamp. Public buildings, $2,15.

New York and New Jersey Globe Gas-Light Company offered to furnish gas generated from naphtha, for the district now supplied by the Williamsburgh Gas-Light Co., at the rate of $23 per lamp a year.

All of the bids include the lighting, cleaning and repairing of street lamps. The figures of the local gas-light companies are somewhat lower than heretofore. The average being $19 per lamp for eight months, the amount per lamp by the year would be between $28 and $29, while the price now paid is $30.25, clearly showing that by the term, "the year," as used by many, the remaining portion of this year was all that is included.

In a portion of New York city there is competition in the supplying of gas lights, and in that portion, as the result, this year, for the first, the city has received very low bids for street lighting, the prices proposed in such competiting district being only one-third the rate paid in the same localities last year, and less than one-fourth the amont paid this year in some parts of the city. Outside of the limited competing districts, the city pays very remunerative prices, noticeably to the Central Gas-Light Company, $45 per burner per annum, and to the Suburban Gas-Light Company $50 per post per year, and these are the rates fixed this year for those companies.

But the query naturally arises, what has all this to do with public lighting in Detroit? Nothing whatever. There is no similarity in the cases or circumstances; nor is it claimed that the street lamps in the two cities consume equal quantities of gas per post They do not by any means. Many other conditions are widely different. No one should attempt to claim the result in a portion of New York city of a bitter competition between rival companies as any criterion for prices in Detroit, when it is not so claimed in the non-competing districts of the city where it exists. It is only a present advantage the city of New York enjoys, by reason of a conflict between rival corporations doing business within its limits, which advantage will terminate at the pleasure of the contesting parties without regard to the city or its advantages. It might as well be argued that because rival steamers carried passengers from New York to Albany, on the Hudson, for 12½ cents each, that our Cleveland steam-

ers should not charge over 10 cents each passage between Cleveland and Detroit, and furnish state-room and meals also.

As having a bearing upon public lighting in this city, it would be much more pertinent, or to the point, to refer to what has been done here during a similar conflict between gas companies.

Street lamps in this city have been disconnected from the mains of one company and connected with those of another, not as in New York, at $8 or $10 each, but free of cost to the city, and gas supplied to them at much lower rate than any price ever yet touched in New York city. Why not argue from this better, more familiar home data, than to attempt to say what must be done here, because something of like general character is done in some wards in New York? Why not? Because it draws attention to the fact that Detroit has already discounted New York in this particular, and has heretofore gathered and enjoyed a most beautiful harvest from the battlefield of contending gas companies; and some conscientious people might be awakened to the conclusion that the city had sufficiently fattened upon the losses of her two most extensive, her chief and most important industries, which it should be her pride, as well as her better policy to protect and encourage as even-handed justice demands, rather than, yielding to ill-timed clamor, seek their embarrassment and destruction.

The Common Council are publicly urged to advertise for proposals for "lighting street lamps," and award contract to the lowest bidder per post per month or per year, as the case may be.

An advertisement for tenders or proposals by the city, generally pre-supposes an honorable, equitable competition between all bidders, and in justice those conditions should be the very foundation of every request by it for competiting offers; but no such spirit of equity exists in the arguments and advice publicly given the Council on this question of street lighting.

The gas companies, better qualified than any others by their large investments of capital in extensive means and facilities for doing just that particular service, *are restricted by ordinance to supplying a certain quality of light, and this restriction is binding upon them under an advertisement for proposals whether mentioned therein or not.*

As bidders they are under specified and onerous restrictions and regulations, and are asked to bid in competition (?) with others free from such restrictions and regulations.

Were the actual conditions expressed in the advertisement the Council is publicly urged to make "for lighting street lamps," it would read somewhere as follows:

"Proposals will be received for lighting street lamps for six months, following 1st of July next; and it will, however, be remembered, that should either of the gas companies become proponents hereunder, they shall be required to supply each street lantern with not less than fourteen sperm candles of standard size and weight (or an equivalent) each night of lighting, while all other bidders may supply each street lantern with one or more of such described sperm candles (or an equivalent) each night of lighting, and the contracts shall be awarded to the lowest responsible bidders per post, for the term mentioned."

Is it possible for any one to claim that such proceedings would be fair, equitable or just? This is exactly what the Council is publicly urged to do.

Let the question be further illustrated without reference to gas light, for there are in all cities, and in all walks of life, a class who become monymaniac on the mention of the word gas, and who at once become oblivious of all sense of justice or fairness in relation to all that pertains to that modern convenience, its supply or its use.

Suppose there to be in the city two firms of very extensive dealers in metals, Messrs. Q. & Co, and Messrs. B. & Co., if you please, and these firms are the only ones dealing largely in the precious metals, and the only parties that could fill a large order within a year. Now also, suppose that the Common Council advertise for proposals to supply the city with "One thousand tons of metal," within eight months, and further provide in the advertisements that "should the firms of Q. & Co., or B. & Co., or either of them become bidders, they shall be required to supply pure gold, but any and all other bidders may furnish lead, iron or any other metal; and the contract shall be awarded to the bidder proposing the lowest price per ton of metal."

Could any alderman expect that either Q. & Co., or B. & Co., would bid under such conditions?

Yet this is an exact parallel to the course, publicly and with well feigned earnestness, urged upon the Council in regard to street lighting. It should be regarded as insulting to the intelligence of that body, and as a satire upon its sense of justice.

If the city wants gold let it advertise for gold, if it desires lead let it ask for lead.

If the Council wish to light the street lamps with fourteen candles in each lantern (or the equivalent) let it so advertise. If but one candle or its equivalent is wanted, let the fact appear in the advertisements.

If the city wants gas-light let it advertise for gas: but if it wants naphtha lamps let it advertise for them; or for either in certain specified localities if it desire to use both; but in no case should it make the useless attempt, by use of general terms to create competition between specific articles, between which there exists by nature no such relations.

DETROIT, May 24, 1878. FAIR PLAY.

[From the New Haven Journal, May 28.]

The Union Gas-Light Company.

THE STOCK HELD BY THE COLLAPSED TOWNSEND SAVINGS BANK, OF NEW HAVEN, SOLD FOR $210,000.

The Townsend bank depositors are interested in the fact that the Receivers have succeeded in selling the bank's interest in the Knickerbocker Gas-Light Company of New York for the sum of $210,000, and a few days ago the money was received, which gives the bank over two thirds of the sum necessary with which to pay another 10 per cent. dividend.

The Knickerbocker Gas-Light Company stock is, perhaps, more familiarly known to the depositors under another name. When this bank was placed in the hands of Receivers there stood on the books an entry showing that the bank owned $500,000 worth of the bonds of the Union Gas-Light Company of New York. This sum represented the entire amount of bonds issued, and gave the bank a first mortgage on the property. The property as an asset was unproductive, as there had never been laid any gas pipes, and consequently the works had never run. The property is located near Fort Schuyler, at the entrance of New York harbor. A retort and other buildings had been erected. The Bank Commissioner, in appraising placed the value at about $300,000. Opinion differed as to its value, and the Receivers were stoutly opposed in their claims on the property, and litigation ensued, ending at last in the foreclosure of the property by the Receivers in behalf of the bondholders. Under the laws of New York the property had to be offered at auction, and the Receivers bid it in, and then a reorganization of the company was had, and the new name of the Knickerbocker Gas-Light Company was adopted. Now the Receivers have sold the property at the figure named above, ($210,000) to parties who wanted to get control of it so as to complete the works and prosecute the business. The names of the parties buying are kept quiet by the Receivers for the present, for the benefit of the buyers, who might not want it known at present. The Receivers say their estimate of the value of the property was pronounced as wild by prominent gentlemen of this city, and Mr. Doolittle is credited with saying that the Receivers have well earned all the money they have got for their labors as Receivers in this transaction alone, they regarding the bargain as an excellent one for the depositors, and obtained in the face of much opposition on an asset which the officers of the Union Gas-Light Company pronounced as comparatively worthless. The Receivers, when $80,000 more is received, promise to declare another 40 per cent. dividend.—*N. Y. Times, May 31.*

Statistics of Albertite.

BY JAMES MACFARLANE.

New Brunswick, Nova Scotia, possesses a mine of a new and beautiful substance, analogous to coal, called Albertite, which is deserving of notice at least as one of the curiosities of our subject. It is situated at Hillsborough, on Peticodiac river, in Albert county, near the head of the Bay of Fundy. Albertite is used in the manufacture of oil and gas, yielding one hundred gallons of crude oil per ton, or 14,500 cubic feet of gas of superior illuminating power. It was discovered in 1849, and there were 56,289 tons of it exported to the United States in three years, from 1873 to 1865.

Unlike coal, it is found in a true vein, or filling a crevice in the rocks, and most authorities now agree in considering the substance as a variety of asphalt, or a solid hydrocarbon, originally fluid, like petroleum, and derived from the decomposition of vegetable or animal products. Formerly it was regarded by different authors as a true coal, an asphaltic coal, and a jet. It is a new material, intermediate between the most bituminous coals and the asphalts, and is found in the lower carboniferous formations. It has a beautiful and singular appearance, having a resplendent resinous lustre, a perfect conchoidal fracture, and it is perfectly free from mineral charcoal, and lines of impure coal or earthy matter. It is, however, divided into prismatic pieces by a great number of smooth, divisional planes, proceeding from wall to wall.

Albertite coal (or solidified petroleum, as it is sometimes improperly called), is also found in Ritchie county, West Virginia, where it is called grahamite or Ritchie mineral.

According to official documents of Canada, the following are the shipments of albertite, for the twelve years from 1863 to 1874:

1863.....	18,600 tons.	1869.....	17,000 tons.
1864.....	19,300 tons.	1870.....	6,000 tons.
1865.....	20,500 tons.	1871.....	5,500 tons.
1866.....	20,500 tons.	1872.....	5,000 tons.
1867.....	17,000 tons.	1873.....	6,000 tons.
1868.....	12,400 tons.	1874.....	7,000 tons.
Total.....			154,800 tons.

Calculated from the royalty paid, there were mined before the year 1863, 22,492 tons, making the total production, 177,292 tons, since the discovery of the Albertite, in 1849.

The marked decrease in the amount reported since 1869, has been due partly to extensive fires in the mines, and partly to a great diminution in the size of the vein. It varies from one to fourteen feet in thickness, and is placed almost vertically in the ground. It has been mined to a depth of 1,162 feet.—*Saward's Coal Trade Journal.*

Setting a Boiler.—In setting a boiler the location should be as near the engine as possible, and free from exposure to currents of air, and should afford convenient access to the flues and fill-pipe connections and general convenience to the fireman. If possible, an outbuilding should be selected. As it is important to keep the boilers level and to maintain a uniform water-line, good foundations must be assured. The side walls must be 12 to 16 inches thick; the furnace and front well lined with fire-brick; the top should be covered with brick, and the steam dome and pipes with felt or other material, to prevent radiation. If the boilers are not suspended, the front end should rest on the fire front and the back end on a stand of cast iron. If a mud drum is used, it should have a rest of good masonry, but the weight of the boiler must not be sustained by it. The stand-pipe should not be used for supporting and supplying the boilers. It makes a joint in an inaccessible place and is liable to leak and rust the sheet to which it is attached. If a mud drum is not used, supply into the back end of the boiler with wrought iron pipe, using the same pipe for supply and blow-off. A new furnace wall is liable to crack. This should be repaired at once. And at all times the furnace walls and coverings should be kept in perfect order.—*Mining and Sci. Press.*

Correspondence

[Correspondents, in all cases, should sign their communications with their names and address in full—not for publication, unless desired, but as a guarantee of good faith.—Ed

"A New Method for Producing Cheap Heating Gas for Domestic and Manufacturing Purposes."

OFFICE NATIONAL COAL GAS CO.,)
320 AND 322 BROADWAY, N. Y.)
June 5, 1878.)

Mr. Editor: I notice a lengthy article in your last Journal (June 3rd) entitled, "A New Method for Producing Cheap Heating Gas for Domestic and Manufacturing Purposes, by S. W. Davies, A. R. S. M."

Before proceeding to describe this "new method," the article says, "It has long been known that if steam be passed over coke or charcoal heated to redness, a decomposition of the steam takes place, hydrogen (H), corbonic oxide (CO), carbonic anhydride (CO_2), and a small proportion of marsh gas (CH_4) being produced. The composition per cent. by volume of the mixed gas produced in this way is, according to Langlois's analysis

H = 54.52 CO = 31.86 CO_2 = 12 CH_4 = 1.62

according to Frankland's,

H = 56.9 CO = 29.3 CO_2 = 13.8.

It is evident, therefore, from these analyses, that we have here a very important heating gas, could we succeed in producing it in considerable quantities economically."

The above extract shows the object of the new method. Then as to the apparatus we are told, "the generator consists of a hollow cylindrical body or case, made for convenience, at present, of wrought or cast iron."

We next get an idea of how the gas is produced. The article says, "If now the tap in front of the blast-pipe be opened, this superheated steam will pass down the small pipe outside the generator and blow with considarable force into the blast-pipe, carrying with it, by its induction action, a stream of air. By properly apportioning the size of the steam jet to the internal diameter of the coil, a constant supply of superheated steam is obtained, and, as a matter of course, a continuous blast of air ensured."

We thus find that the heating gas produced by this new method is the product of *steam and air*. We are then furnished with analyses of this gas, showing its composition. I quote one of these—

"CO=	22.6
H=	10.0
CH_4=	4.9
CO_2=	4.5
N	58.0
	100.0"

So it appears that 58 per cent. of this gas is *nitrogen*. But as nitrogen is inert in its properties, and it is *not inflammable;* but on the contrary, "*burning bodies are at once extinguished*, when immersed in it," as scientists inform us, it is difficult to understand how it can be of any use or benefit in gas for heating purposes. We know that it forms about four-fifths of the bulk of the air, and is a good diluent to reduce the too energetic qualities of the oxygen. But when the most energetic heat, with the least cost is the object, there can be no good reason for putting a water-soaked log with your kindling wood, into your oven to heat it. It is true the log will increase the bulk; but it not only will not burn, but it absorbs a portion of the heat from the dry, inflammable kindling wood. In the same manner the 42 per cent. of the inflammable part of the gas under this new method, would be more valuable for heating purposes, without the hydrogen than with it.

The inventor of the above new method is a great way behind in producing water gas, either for heating or lighting purposes. He does not seem yet to understand what has been already fully demonstrated.

1. That no iron can stand a high degree of heat sufficient to rapidly and perfectly decompose steam.

2. That the greatest economy in producing water gas, for either heating or lighting purpose, consists in first raising the steam to the highest possible degree of dryness, and then to pass it, in finely divided jets, through a body of anthracite coal, heated to whiteness, or under the highest heats, without variation, that the best clay retorts will stand without injury.

3. No per cent. of air that can be avoided should be allowed to enter any gas used for lighting or heating purposes It is a vile adulteration and all adulterations are impositions.

The inventor of the new method seems to think that the idea of using water gas for fuel originated with him, whereas it was fully tested here nine years ago, when with small jets, a stone oven could be heated in five minutes, sufficient to bake bread. But it was with water gas made under the American system, the analyses thereof showing its composition to be as follows:

H = 59.87, CO 36.29, CH_4 6.84.

The high calorific intensity of the flame of this gas is, therefore, apparent, and before this can be exceeded by any gas, something far better than 85 per cent. of nitrogen must be produced.

H. P. ALLEN.

Gas-Light Intelligence.

OUR EXCHANGES.

United States.

[*Engineering News.*]

COST OF STREET LIGHTING IN CHICAGO.—Chicago's estimate for street lighting the present year is $325,000.

NUMBER OF STREET LAMPS IN WORCESTER, MASS.—Worcester, Mass., has 675 gas lamps and 619 gasoline; total, 1,204, maintained at an annual average cost of $20 each.

SAN FRANCISCO COMPLAINING.—San Francisco papers continue to complain about the "frightful gas monopoly" in that city.

THE GAS QUESTION AT WALLA WALLA, W. T.—This is the state of the gas question as Walla Walla, W. T., as set forth in the *Union:* This city is blessed by many manufacturers of non-burning gas, but no person or company has yet seriously undertaken to introduce an article that will burn and give light. Won't some one do so?

PROPOSITION TO LIGHT WACO, TEXAS.—The City Council of Waco, Texas, accepts the gas company's proposition for one year, the gas company to furnish gas equal to 18 candles at $4 each post per month, and to light, extinguish and keep in repair; streets to be lighted every night except four nights nearest full moon.

A NEW GAS COMPANY.—A new company has been organized to build a coal-gas works for Dennison, Texas; capital $30,000. The officers are Samuel A. Miller, President, Louisville; A. B. Bowman, West Louisville, Secretary. Operations will be commenced at once, and fine works are promised. The city was formerly lighted by a coal oil works, which has been abandoned.

WARREN, OHIO, GAS-LIGHT CO.—The committee appointed to confer with the Warren, Ohio, Gas-Light Company, made their report at the meeting of the Council held on the 22nd ult., the substance of which was set forth in a proposition from the company, as follows: To sell their works to the city for $30,000 in cash, or bonds bearing six per cent. interest; or to reduce the price to $2.50 per thousand feet for the city, and $2.75 to private consumers. The company was asked to reduce to $1.50. The whole subject was laid on the table till the next meeting.

[*N. Y. Commercial Advertiser*]

A NEW GAS-LIGHT COMPANY.

Coney Island has become one of the most attractive watering places of the country, and is to be further improved this season by the introduction of gas-light. Heretofore the Brighton of America has been lit up during the evening by means of kerosene lamps, requiring the time of several attendants to keep them in order, causes losses in the continued breaking of lamp glasses, and especially endangering the safety of all the buildings through fire; for the hotels are all of so inflammable a nature, that if one should be burned down through accident on a gusty night or day, the whole would be swallowed up by the flames, with very little probability of escape. This danger, with other considerations, have led to the

ESTABLISHMENT OF A GAS COMPANY,

the works of which are located near the Boulevard at Coney Island, and already over two miles of main have been laid up and down the Island, and partially along the Ocean Parkway. As it is proposed to open the season at this now favorite watering place on or about the middle of June, the Kings County Gas-Light Company expect to have their connections laid down with all the hotels by that time, besides having the drives and streets lit up. As the price of the gas is only to be $2.50 per thousand feet, it is estimated that with the reduction of the premiums of insurance, the lessened necessity of attendance, and the saving in breakage, that the expense of the gas will very little, if any, exceed the cost of the oil illumination, besides being so much safer. An accidental breaking of a lamp might cause a great conflagration, while no danger is likely to be experienced in

THE USE OF GAS.

It is believed that by thus lighting up the Island with gas, the business during the evening will be so largely increased that, in this alone, the additional cost, if any, of the better light will be overcome by the extra profits thus gained by the hotel keepers. The business men of New York rarely have an opportunity to visit Coney Island in the afternoon, but could easily meet their wives and families at dinner in the evening; and when the place is lit up with gas, and the police arrangements are carried out as they were last season, they will have no hesitation in allowing their families to go alone to the beach during the day, and then join with them in the amusements of the evening, which will consist of

OPEN-AIR CONCERTS, ETC.

The gas company does not, however, depend upon Coney Island alone for its business. Under an act of the Legislature all the lower part of Kings County, including the towns of New Utrecht and Gravesend, has been laid out in streets, and is rapidly growing up. The company having received the right to lay down gas pipes throughout these townships, workmen are engaged in preparing for the lighting up of the King's Highway, Ocean Parkway, the village of Gravesend, already well populated, and other similar places, including all the private residences along the route to the beach. The gas works are so located that these localities can be easily supplied with the gas, at the same rate of charge as in the city of Brooklyn.

Great Britain.

GAS WORKS IN MANCHESTER, ENG.—There is one gas works in Manchester, England, owned by the city corporation. There are 8,601 public lamps, which burn 3,666½ hours per annum, each at the rate of four cubic feet per hour; they are 120 to 150 feet apart. The standard is 20 candles. The length of gas mains is 545½ miles; 71,775 meters are in use; 2,070,715,300 cubic feet are annually made.

LIVERPOOL UNITED GAS-LIGHT CO.—Liverpool, Eng., has one gas-light company, known as the Liv-

erpool United Gas-Light Company. They have ten thousand public lamps which are lighted by the company; they burn 3,620 hours per annum each and consume four cubic feet per hour; they are 180 feet apart. The average illuminating power is said to be 20 candles, that being the limit fixed by law; 65,000 meters are in use; 2,000 million feet are made annually. The capital stock of this company is £1,068,728. Thirty-five shillings is charged per lamp per year, and thirteen shillings for the lighting. The price to consumers is three shillings per thousand feet.

Gas Fittings on Hire.

The Directors of the Sheppy Gas Company have introduced a new feature into their plans of operation, which, we think, might be advantageously extended, viz., the supply of gas fittings on hire, on the "three years system" of hire and purchase.

From a circular which they have issued to their consumers we make the following extracts, which may be of use in other localities in which it may be desired to adopt the plan:

"The Directors believe that, from its cheapness and comfort, the use of gas in ordinary dwelling-houses would be much more generally adopted, if it were not for the first expense of providing fittings, and the inconvenience of their removal in case of change of residence. To obviate this difficulty, they provide all the necessary fittings in private houses at a small quartarly rent, giving the consumer the option of purchase at any time, at a fixed price. Half the amount paid for hire is deducted from the original price if the fittings are subsequently purchased.

"If the fittings are not retained in use for *twelve months*, a charge for labor in fitting and removing will be made.

"In hired houses, as a protection to the property of the company, a consent from the owner to permit the fixing and removal of the gas fittings will be required. A printed form for signature by the owner, or his agent, is provided by the company.

"The charge for the hire of meters is for 2 lights, 6d.; 3 lights, 9d.; and 5 lights 1s. per quarter.

"The cost of fittings for 2 lights, 1 in each ground floor room, is about 30s., according to the description of gas fittings required.

"The charge for the hire of fittings of the purchasing value, not exceeding £1 10s., is 9d. per quarter; £2 value, 1s. per quarter: and so on, at the rate of 6d. per quarter for every £1 selling value; or

"Subject to exceptional circumstances, the charge for the hire of fittings for 2 lights will be 9d. per quarter, increased by 3d. per quarter for every additional light.

"In cases where fittings are required for shorter periods than one year, special rates of hire will be given.

"Globes and shades are not supplied on hire; these are charged for, if required, at 1s. each and upwards.

"No charge will be made for repair of fittings on hire, except in cases of breakage or damage other than ordinary wear.

"Since the introduction of this system, in 1867, over 250 houses in Sheerness have been fitted up on hire, and the number is constantly increasing.

"As a guide to those unacquainted with the usual cost of burning gas, it may be stated that the burning of one light will, with proper precaution against waste, cost about £1 10s. for the year, or about 1d. per night, summer with winter. *This must not, however be taken as indicating a fixed price, as the cost is solely regulated by the size of the light used, and the number of hours it is burned.* The price above given is only instanced as that which will, with care, and under ordinary circumstances, afford a light many times superior to that to be had either from candles or oil; beside, in winter time, effecting a great saving of fuel for warming purposes.

"THE 'THREE YEARS SYSTEM' OF HIRE AND PURCHASE.

"By the ordinary system, owing to the small charge for hire, the fittings must be in use twenty years before they become the actual property of the hirer. As it is found that many consumers would prefer purchasing their gas fittings within a shorter period, the company are prepared to supply fittings of the same kind as those usually provided on hire, to be paid for in *three years*, by twelve equal quarterly payments, thus:

Fittings, value	£1 10s.,	12 payments of	2s. 6d.	per qr.
"	£2 0s.,	"	3s. 4d.	"
"	£2 10s.,	"	4s. 2d.	"
"	£3 0s.,	"	5s. 0d.	"

And so on in proportion.

"These fittings, it must be understood, remain the property of the company until the twelve payments are completed, but if returned to, or removed by the company in good condition, at any time after six quarterly payments have been made, one half of the amount of such payments will be returned. In all other respects the ordinary conditions on which fittings are supplied on hire will apply to those provided on the 'three years system.'

"Consumers who now hire fittings on the old terms may purchase them on the 'three years system,' at the original value, less one half the hire previously paid by them.

"A pamphlet illustrating the economy, cleanliness, and safety of the use of gas in all classes of dwellings, is to be had gratis, on application at the office; also any further information required respecting the hire of gas fittings, etc.

"Gas cooking-stoves of improved construction, for baking, roasting, boiling, etc., are supplied and fixed on hire, at the rate of 6s. per annum and upwards, according to size, etc."—*London Jour. Gas-Lighting.*

The Gas Burner Man.

Upon almost every day in the week my *sanctum sanctorum* is invaded by some individual anxious to display a new toy, an invention for growing potatoes without soil, or some equally desirable invention, which he is willing to dispose of for a mere matter of money—money paid upon the spot. Oftentimes the obstrusive stranger belongs to the gentler sex, and I have frequently to seize my hat, and after boldly, and yet sinfully, departing from my usual path of truth, to rush forth and await the exhaustion of my visitor's patience. It is indeed no exaggeration when I say that for two mortal hours I have beat a tattoo with my impatient feet (and during that length of time have certainly not improved my reputation for the possession of an equable temperament) ere a lady in decent black would come forth and allow me to return in peace. Even when this desirable result was attained, I found that an inkstand and an ivory paper-knife (the gift of an admiring damsel) had taken their departure with the soft-spoken lady who called to direct my attention to a new work upon the higher education of women in Dahomey (to be produced, I believe, in monthly numbers of half-a-crown per copy). Of these callers the name is legion, but upon my honor the man who "begged to introduce a new and most improved gas burner" to my notice surpassed all his predecessors in his mode of attack, his imperturbability, and his unfailing politeness under what must have proved the most trying conditions. I was soothing my somewhat exhausted mind with a most admirable leading article upon the Conservative party, and thinking that it was well-nigh time to go forth in search of luncheon. At this juncture a clerk entered my room, and handing me a card, announced that a gentleman wished to see me concerning the gas supply. That supply of late had certainly been intermittent, and I directed that the visitor should be introduced. A tall, fine-looking man entered, and depositing his hat and a small bag upon the nearest chair, stood and bowed. Desiring him to take a seat, I proceeded without any questioning to acquaint him with the state of affairs, and after talking for some ten minutes, inquired if he was prepared to suggest a remedy.

"Most decidedly, my dear sir," (I do object to be called "My dear sir") he replied, with a smile. "I have here" (and he proceeded to open the bag) "an article which will most effectually remedy the evil you complain of. It is an improved burner, and I will fix it upon one of your jets to demonstrate the fact."

I thought that he represented the most obliging gas company that I had ever heasd of, and congratulated myself upon being one of their customers, or clients, as my visitor would have termed them. Though a most gentlemanly man, he was also a quick workman, and in a minute or two the old burner had been removed, and the "improved article" adjusted. My friend stood with his tools in his hand, and gently moving his dexter hand towards the burner, in a manner that would have made the fortune of a dancing master or a conjuror, desired that I should apply a light to the jet. I did so, and the flame was a most brilliant one.

"There, my dear sir," ("My dear sir" again; I was beginning to feel suspicious of my affable friend), "don't you consider that a decided improvement?"

"Certainly," I replied; "and I shall be glad to know the name of the makers, in order that, after a fair trial, I may order more."

He opened the bag again, and with another sweet smile (my suspicions increased), handed me a prospectus of the New Gas Burner Company. I thanked him, and after wishing him good-day, took up my newspaper.

"You will excuse me, my dear sir," (I now saw that I had been trapped) "but I shall be glad to receive the trifling sum of 2s. 6d. for the burner that I have fixed, and with which you have expressed your entire satisfaction."

It is needless to relate how my patience was fairly exhausted, my good temper entirely a matter of the past, and that the affable stranger bowed and smiled in response to my excited language and wild demonstration; also perfectly unnecessary to say that he obtained the sum demanded, and went upon his way to ensuare other victims. As the beggar said to Voltaire, "A poor devil must live."—*London Journal of Gas-Lighting.*

Petroleum in Roumania.

According to a communication from Dr. Heinrich E. Ginth, published in the *Gesterreichischr Monatschrift fur dən Orient*, very extensive deposits of petroleum have been discovered on the eastern and southern slopes of the Transylvania Carpathians, and as this may furnish a good field for British enterprise after the settlement of the Eastern question, I furnish an abstract of Dr. Ginth's report for the *Society of Arts Journal.*

1. The Moldavian Petroleum Field.—These occupy a surface of about 230,000 hectares (568,422 acres), forming a triangle, bounded by the rivers Taslen and Trotusch, not far from the station Adschud, on the Roumanian Railway. The wells near Morneschti do not exceed 120 meters (394 feet); those near Salante and Comonesti 50 to 70 meters in depth. They are worked in a most primitive way. The proprietors of the land receive, instead of rent, one third of the gross produce. The cost of the petroleum at the well's mouth does not exceed four francs per 100 kilogrammes (220 lbs.). The wells are 25 kilometres (15½ miles) distant from the nearest railway station; but a line is to be built from Adschud to Tirgei Okna, only ten kilometres from the wells. The Moldavian petroleum is darker than that of Galicia, and since it remains fluid at a temperature of 20° Celsius (4 deg. Fah. under Zero) is well adapted for street lighting. The specific gravity of the raw oil is 1·307, that of the distillate 0·742. According to Ginth's analysis, 1000 parts of raw oil contains

	Parts.
Illuminating oil, best quality	358
Ditto second "	301
Tar	176
Refuse	165
	1,000

At present about 7000 barrels are filled in this district. The export of Moldavian petroleum to Austrian Galicia rose from 500 barrels in 1872 to 2,350 barrels in 1876.

2. The Wallachian Petroleum District.—This lies on the southern slopes of the Transylvanian Carpathians, and is more extensive than that of Moldavia. The wells are from six to twelve miles north of Plojeschti, a station on the Roumanian Railway. In Bakoni the inhabitants use the inflamable gas which issues from the ground to cook their meals. Steam pumps are not used. The manner of obtaining the oil is as primitive as that employed in Moldavia. The landlord receives a tenth of the net produce as rent for the wells. Part of the crude petroleum is refined at Sarati and Plojeschti, and part is sent by rail to Vienna, Pesth, and Odessa. A thousand parts of the crude oil contains:

	Parts.
Illuminating oil of best quality.....	400
Ditto second "	200
Paraffin.....	225
Refuse.....	175

When the Roumanian and Transylvanian Railways are connected by the line now being built from Kronstadt in Transylvania through the Tomas pass to Plojeschti, there will be a large demand in Hungary and Austria for this crude petroleum, which is cheaper than that of Galicia, and is admitted into Austro-Hungary duty free, while American petroleum is subject to a heavy duty.

The immense extent of the Miocene formation in Wallachia justifies the hope that when the present rude processes are aided by those which have been so successful in Pennsylvania, the Roumanian oil-fields will become a source of wealth to the population. I am ready to give further particulars.

JOHN FARWELL, JUN.

—*Journal Society of Arts.*

Atmospheric Gas Engines.

For some time past gas engines have been coming more into favor, and many important improvements have been from time to time introduced; Mr. I. Simon, of Nottingham, has now made some further progress. According to his invention atmospheric air is compressed by a pump, and stored in a reservoir, from which it is withdrawn and utilized to fixed quantities by suitable valves under control of the moving mechanism after the engine is first started. In connection with the inlet valve chamber, which is of a given dimension, is another valve, by which coal gas, under ordinary pressure of towns or by other pressure, is caused to enter the chamber of the air pump that the two agents may become thoroughly mixed, and in certain proportions for obtaining the best results from explosion and consequent expansion within a cylinder in which a piston is fitted, as in ordinary gas engines.

A separate compression pump for gas may also be applied, so that the gas and air may be compressed separately and allowed to mix under pressure at any convenient point before entering the explosion cylinder. The coal gas, or it may be other gas, such as that known as benzoline gas, can be injected into the air vessel or reservoir of the air pump at the same time as the air, or alternately with it, so that the two, that is, the air and the gas, not only become thoroughly mixed, but put under pressure. The air gas thus compressed is conveyed to the working cylinder of an engine by pipes, a distinct pipe taking either ordinary coal gas or benzolene gas into the cylinder after each charge has exploded, by the remains or refuse of which atmospheric air being admitted by a separate pipe to sustain this flame, a light is produced for exploding the fresh main charge which is directly after the exhaust admitted to the cylinder. By this means the explosion of one charge takes place by a light left burning after the previous charge, and so on alternately. In lieu of the coal or benzoline gas being of the ordinary kind, it may be had by a distinct pipe from the contents of the reservoir, in which case a constant light for firing the charge can be maintained. He purposes using a carefully balanced fly or power wheel with this class of engine to ensure the return of this piston by its momentum, and thereby an exhaust, the explosions always happening while the crank is effecting the forward or upward thrust, and the exhaust of each expended charge on the return. The piston-rods of two such engines being coupled to one crank, and working alternately with force, will effect a great saving.

One of the great objections to gas engines hitherto made, and a cause of their great relative cost, has been the great dimensions necessary to obtain adequate power. By admitting the air and gas under a pressure varying, say, from 20 lbs. to 80 lbs., he obtains sufficient power from explosions in a small cylinder, and the other parts of the engine are small in proportion. The engine can also be made double-acting by the use of two cylinders, the explosions in which takes place alternately.—*Seward's Coal Trade Journal.*

Carbon Telephone.

An English correspondent sends us the following: We gave an account a fortnight ago, of the remarkable discovery made by Mr. Edison, that a slab of carbon, subjected to varying pressure, had its electric conductivity altered with the different degrees of pressure—a discovery that had led to the construction of the then best form of telephone for telegraphic purposes. So rapid is the march of discovery nowadays, however, that we have already to announce that Mr. Edison has been beaten on his own ground.

Prof. Hughes, the well-known inventor of the type-printing telegraph bearing his name, has discovered that certain substances possess the property of becoming excessively sensitive to vibrations, and has already succeeded in producing the most delicate acoustical instrument that could be imagined. The telephone had no sooner entered public life than it was improved upon, and improvement has followed improvement until progress is apparently stayed by the remarkable discovery made by Professor Hughes, which is itself doubtless capable of considerable modification, for at present it is "ridiculously simple." It would occupy far too much space to give even a brief account of the experimants already made, but a few lines will suffice to explain the marvellous results already obtained. Two of the common French "wire" nails are fastened down to a board about a millimetre apart (barely their own thickness); a wire from one leads to a battery, and the other is connected by a line wire to a telephone (Bell's), which is also connected by another line wire to the battery, thus completing the circuit, when another nail is laid at right angles across the two fixed to the board. The third nail, it will be understood, touches each of the others in a mere point, for, all being circular, no greater surfaces can he in contact; but it will scarcely be credited that, on speaking to or at the nails, the words are transmitted by the nails to the telephone and are distinct and clear at the distant end of the line. This arrangement, simple as it is, is not the most sensitive telephone that can be constructed.

The most extraordinary instrument consists of a simple piece of thin pine, glued to a tolerably stout base-board in such a manner that a section would have the form of the letter L. To the anterior surface of the upright limb or sound-board (the thin piece of pine), two small blocks of carbon are secured, in the opposing faces of which two hollows or cups are cut, which receive the pointed ends of a stick of gas carbon, such as is employed for the electric lamp. The wire from a small battery passes through the sound-board and enters one of the carbon blocks and the line-wire enters the other, the circuit being completed, some miles distant, by the wire from the battery and the line-wire being connected to a Bell telephone. The transmitting instrument is thus a vertical rod of carbon supported by carbon blocks attached to a thin piece of wood. On speaking to the latter the vibrations are transmitted to the diaphragm of the telephone, which may be many miles distant, and are there reproduced in loud and distinct tones. If the base-board itself is merely brushed with a feather, a loud grating noise is heard in the telephone at the receiving end of the line, and even the footfalls of a house-fly can be distinctly appreciated by the ear of the listener at the telephone. We need scarcely say that the capabilities of so wonderful an instrument are as yet but imperfectly understood, for the discovery has astonished those who were best acquainted with the powers of the now common telephone.

Electric Lights in Towns.

A department of the Paris Exhibition is to be specially devoted to electric lighting, and important results are expected to follow from the practical demonstrations to be there given. The electric system cannot compete with gas for domestic purposes, at least until it is better developed and experience in its application has been gained, but there is no question that for illuminating large open spaces in towns, such for instance, as Trafalgar-square, it is far superior to gas in economy.

With the new dynamo-electric machines invented, apparently simultaneously, by Mr. S. A. Varley and Dr. Werner Siemens, it is calculated that one hundred horse power, applied through a suitable machine, would yield an illuminating power of not less than 150,000 candles, and that distributed from three points would cost not more than 23s. per hour—each lamp or light centre enabling small print to be read at a distance of a quarter of a mile.

Putting gas at the unheard of cost of only 2s. per one thousand cubic feet for a light of 20 candles per hour, there is still an economy of four to one in favor of the electric system. The cost of the latter depends mainly on the expenditure for motive power, and more will be heard of the subject after the Paris Exhibition, where steam-engines, gas-engines, and water-power will be tried against one another; but it may be safely assumed that, where it is possible to erect a steam engine to supply the requisite power, the cost of the electric light will be only one-fourth that of gas. Where a number of lights of moderate illuminating power are required the advantage is probably still with coal gas, but that advantage will be lost when a practical method of subdividing the electric light is discovered, and M. Jablochskow's system promises to supply all that is needed. For electrotyping and electroplating dynamo-electric machines have superseded the battery current, and it cannot be long before means will be found to adapt them at least to the necessities of street illumination. As the matter stands at present, it is only on the large scale that dynamo-electric machines can be used to advantage.—*Gas Trade Circular and Review.*

English Coal in Boston.

The *Boston Journal of Commerce* says: Since soft coal from Newcastle, England, began to be shipped here of late, (a period of about six months) no less than thirty steamer cargoes have arrived in Boston, bringing on the average about twelve hundred tons each. Contrary to what may have been expected, these shipments continue to promise to be kept up for quite a time yet. A good many of these steamers were formerly engaged in the Black Sea grain trade, and as these ports were closed by the late Turko-Russian war, the steamers have been diverted to our grain-carrying trade. This soft coal (for gas purposes mainly), has been brought from Newcastle at lower freights than coal is often brought to our city from the Pennsylvania mines.

The recent decision of Russia not to open her grain ports, will cause these steamers to resort to this coal and grain-carrying trade with our country, until the matter regulates itself in some way. Last week the

price of the Penn gas coal was reduced to a lower figure than ever before, viz., $4 on board at Baltimore, making about $5 50 here. The Newcastle coal has been selling at $3.80, but the Penn coal at the reduction is considered fully an equivalent, owing to its superior richness. The Newcastle coal importations will be checked unless grain freights go higher; and may even then, especially if war risks have to be paid. There is a limit to the use of the foreign article, as only the large gas companies can buy to advantage, and even they have to use the American coal with it to enrich it. To show how curiously trade changes, it may be stated that about the time of the great fire in Boston, a certain house here was figuring as to sending a cargo of Cumberland coal to England, and only a shilling a ton stood against the feasibility of the venture.—*Saward's Coal Trade Journal.*

Mineral Resources of British Burmah.

In British Burmah, the metalliferous minerals are chiefly found in the Tenasserim division: tin in Mergui and Tavoy; lead in Maingay Island, Amherst and Toungoo; iron in Amherst and Shive-gyeen; copper and antimony in the hill confines of Toungoo. Gold exists in the Shive-gyeen river, a stream which flows from the western hills. A special report on the minerals of this division was submitted by the late Mining Geologist in May, 1875. After prolonged local inquiries he came to the conclusion that the minute quantities of gold which appear to be found do not come from quartz reefs, nor are they brought down the rivers from their sources, but are sparsely disseminated throughout the granite of the country, where they are found in the disintegrated *debris*. Tin is the only metal which is worked scientifically and well.

The mines to the south of the Mergin district, in the townships of Lenyah and Malewoon, have always attracted considerable attention, and the ore is said to become more plentiful the further south it is followed. A European firm, three years ago, took a lease of the Malewoon mines, and have opened out roads and imported machinery, with a view to their thorough exploitation. Several large and valuable lodes have been struck, pronounced to be equal to some of the best Cornish mines; but the turn-out of metal has hitherto been inconsiderable, owing to the time which has intervened in obtaining machinery and the milling furnaces. Large quantities of the crushed ore have, however, been collected, and are available for smelting. Elsewhere, the mines are worked by Chinamen, who use no machinery, but excavate cuttings from 15 to 20 feet below the surface. The metalliferous deposit is smelted in a rude kind of furnace.—*Jour. Soc. of Arts.*

Painting Iron Work.

At a recent meeting of the Liverpool Engineering Society, the president of the society, Mr. C. Graham Smith, delivered an address of much practical value upon this subject, which is thus epitomized: The paints used for iron work are of every description, name, and quality. The usual varieties employed for preserving it against corrosion may be divided into lead, iron, oxide, silicate, and tar paints. Differences of opinion exist as to the relative merits of the first three descriptions, but the experience of several foremen painters is decidedly in favor of lead paints, when of good quality and mixed with good oil, without spirits. Unfortunately there are no reliable practical tests to insure good materials alone being used; consequently both the colors and the oils are often inferior in quality, and much adulterated. For these reasons and on account of cheapness, iron oxide paints are by some preferred.

A little white lead mixed with the red makes it go further and easier to work into corners. If the coats are put on with pure red lead, owing to its weight it is liable to run off; but the last coat should consist of red lead alone. The tar paints are more often used for iron work which is not to be seen, such as water pipes, floor plates of bridges, and girders which are to be built into masonry or brickwork. It is cheap and answers well for such purposes, and for sea-work, as it is said not to foul as readily as lead or other paints of a finer description.

A good rough paint of this class may be made by heating ordinary coal tar, and mixing with it finely sifted slacked lime, in the proportion of between half a pound and a pound of lime to a gallon of tar, adding sufficient naphtha to render it of a convenient consistency for laying on. This composition should be applied while hot, but care should be taken not to keep it over the fire too long, or it will lose its essential oils, and be reduced to a substance in all points resembling pitch. Some positions admit of the paint being sanded, in which case it should be done, as it adds to its durability. Before painting iron work it is usual to give it a coat of boiled linseed oil, applied hot; this forms a kind of varnish, and is found to be an excellent preparation for the after coats of paint. Opinions differ as to when the coat of oil should be applied. Some engineers specify that the iron should be brushed over or dipped in oil while hot from the rolls. The efficacy of this method is doubtful, as the iron, in undergoing its workshop manipulation, is subject to rough treatment, and portions of its surface are sure to become exposed. Others specify that the iron should be brushed over with hot oil just previous to the various portions being placed together. This answers well for ordinary work, as by the time it has gone through the workshops the blue shales have to some extent been knocked off.

These blue scales are in a greater or less degree inseparable from the manufacture of the iron; but it is very important that they should be removed by some means or other before the paint is put on, for if not, in a short time they will peel off and bring the paint along with them. The best way to guard against this is to have the iron work put together in the yard and tested previous to either oil or paint being put upon it. A slight rust will form over the whole surface of the work, which will cause the blue shales to fall off. The rust should then be scraped off and the whole of the work rubbed down, which will render the surface peculiarly fitted for receiving the after coats of oil and paint. The oil should follow up as closely as possible the man cleaning the work. It is almost needless to point out that the efficiency of this method entirely depends upon the thoroughness with which it is done, and no engineer is justified in specifying it, unless he proposes putting an inspector to see that ir is properly performed.—*Western Manufacturer.*

Prices of Gas Coal.

The market present no new feature of interest. Producers of coal have abandoned all hope of further contracts for American coal for the season's requirements, and those who have deliveries to make, are occupied with the attendant details of its shipment.

Coastwise freight continue to rule less, with no indication of any immediate advance. Rumors of disaffection among miners on the line of the Chesapeake and Ohio Railroad are current, and are of just sufficient importance to make it prudent for consumers to keep their supplies sufficient for any contingency that may arise from the repetition of the troubles of a year since.

Two steamers are on the way to New York with Newcastle coal, imported on orders, at a cost of $3.75 @$3.80, currency, delivered.

The importations of Provincial coal continue. The arrivals at New York since our last issue, have been two steamers and three sailing vessels, bringing about three thousand tons.

General quotations continue unchanged.

At New York.

Westmoreland	5.50	4.00 at Baltimore.
Penn	5.50	4.25 at Philadelphia.
Waverly Youghiogheny	5.25	
Moore's "	5.50	
Shafton	5.35	
Despard Marion	5.15	
Newburgh Orrel	@	3.85 at Baltimore.
Murphy Run	5.25	
Chesapeake and Ohio Agency Coal	5.25	4.00 at Richmond.
Newcastle	3.75 @ 3.85	
Provincial	4.15 @ 4.50	
Cannelton Cannel	10.00	
Ince Hall	8.00	

Gas Stocks.

Quotations by G. W. Close Jr., Broker and Dealer in Gas Stocks.

(with W B Scott & Co.,)

24 Pine street, New York City.

June 17, 1878.

☞ All communications will receive particular attention

☞ The following quotations are based on the par value of $100 per share. ☜

	Capital.	*Par.*	*Bid.*	*Asked.*
Gas. Co.'s of N. Y. City.				
Central, Westchester	466,000	50	75	85
Harlem	$1,850,000	50	85	88
Manhattan	4,000,000	50	195	198
Metropolitan	2,500,000	100	130	133
" Scrip	$1,000,000	...	100	103
Mutual	5,000,000	100	75	77
" Bonds, gold.	900.000	1000	—	105
Municipal	1,000,000	100	95	100
New York	4,000,000	100	98	100
Suburban, W'steh'str	390,000	50	—	100
Gas Co.'s of Brooklyn.				
Brooklyn	2,000,000	25	138	143
Citizens	1,200,000	20	70	—
" Scrip	220,000	1000	95	97½
Peoples	1,000,000	10	25	35
" Bonds	$ 325,000	...	—	95
" Scrip	300,000	...	75	80
Metropolitan	1,000,000	100	—	75
Nassau	1,000,000	25	—	78
" Ctfs.	700,000	1000	96	98
Williamsburgh	1,000,000	50	81	—
" Scrip		...	95	97
Kings Co	200,000	100	80	90
Union Co. E. N. Y.		25	—	50
Richmond Co., S. I.	300,000	...	80	90
Out of Town Gas Companies.				
Bath, Maine	70,000	100		
Buffalo Mutual, N. Y	750,000	100	65	70
" Bonds	200,000	1000	95	100
Baltimore, Md	2,000,000	100	134	134
" Ctfs., gold	1,000,000		106	110
Bayonne, N. J		100		90
Brockport, N. Y	25,000	100	...	80
Citizens, Newark	918,000	50	109	110
Chicago Gas Co., Ills			150	
" " Bds.	124,000	—	105	107
Cincinnati G & C Co				190
Derby of Conn	160,000	100	60	80
East Boston, Mass.		25	132	—
Elizabethtown, N. J.	300,000	20	—	130
Fort Wayne, Ind.		100	...	—
Hannibal, Mo	100,000	100	95	100
Hartford, Conn	700,000	25	184	186
Hempstead, L I.	25,000	100	...	—
Jersey City	386,000	20	155	160
Jamaica, L. I.	25,000	100	...	—
Jacksonville, Ill	120,000	50	82	...
Lewistown Maine	400,000	100	70	80
Lima, Ohio,	60,000	100	—	...
Bonds	30,000		90	
Laclede St Louis Mo.	1,200,000	100	100	110
Long Branch		20	40	0
New Haven, Conn		25	100	
Peoples, Jersey City		...	120	125

NEWCASTLE AND PROVINCIAL GAS COALS.

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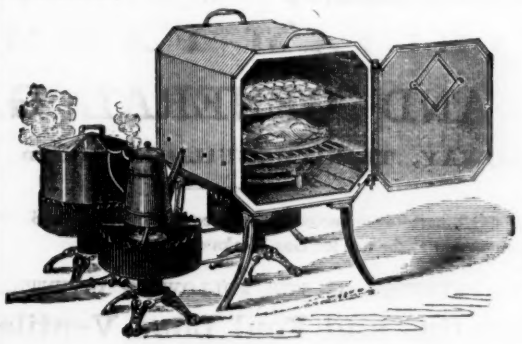
10,000 Cubic Feet of 16 1-2 Candle Gas---40 Bushels Coke.

91 STATE STREET, BOSTON. **PERKINS & JOB.** 45 SOUTH STREET, NEW YORK.

Peoples of Albany...	650,000	100	–	27
" Bonds	350,000	1000	–	–
Peoples of Baltimore		25	51	52
" Bonds....			106	—
Plainfield, N. J.....	80,000	100	—	105
Perth Amboy		25	—	95
Rochester, N. Y.....		100	50	60
Woonsocket, R. I....	150,000	100	100	...
Halifax N. S.....	400,000	40	148	150
Hamilton, Ontario...	150,000	40	117½	
San Francisco Gas-Co., S. Fr'isco Cal.			93	94
St. Louis, Missouri..	600,000	50	73	75
Stillwater, Minn.....	50,000	50	—	26
Saugerties, N. Y	15,000	100	95	100
Troy, Citizens.....	600,000	100	—	60
Toledo, Ohio.....			95	97
Washington, D. C...		20	230	240



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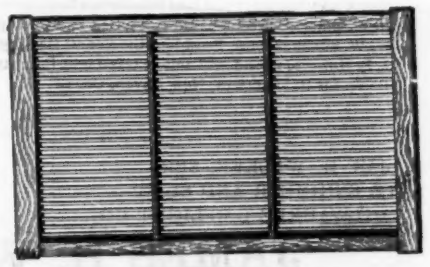

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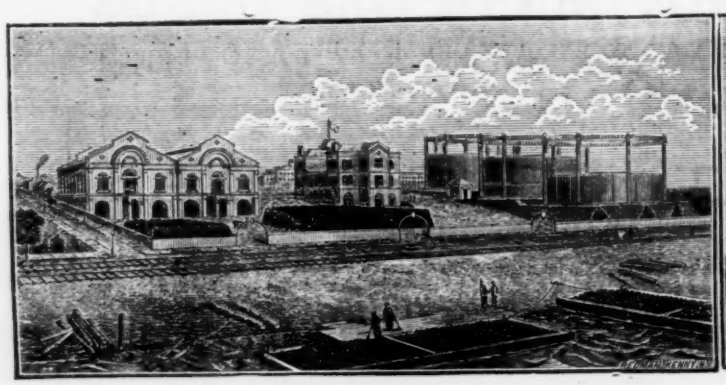

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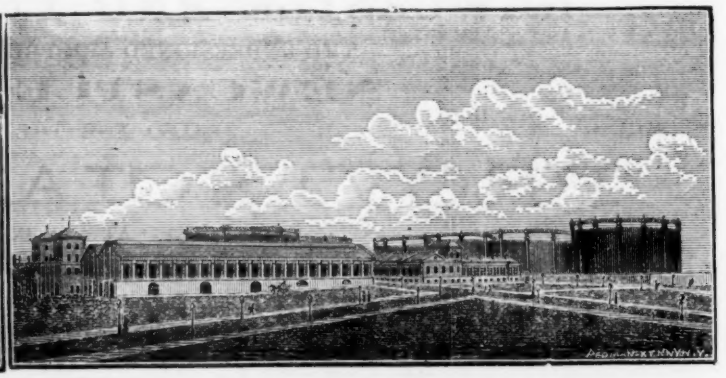

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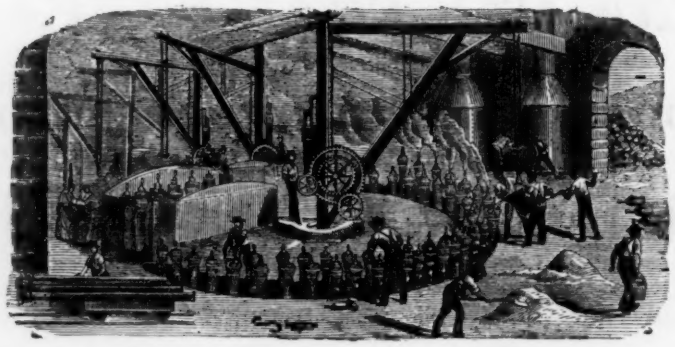

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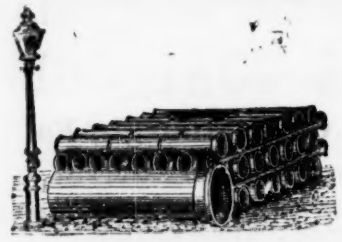

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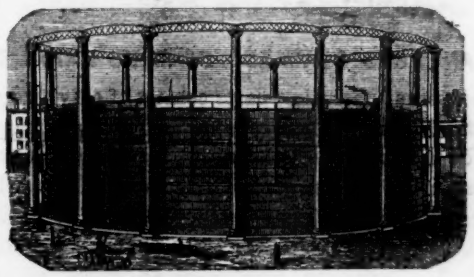

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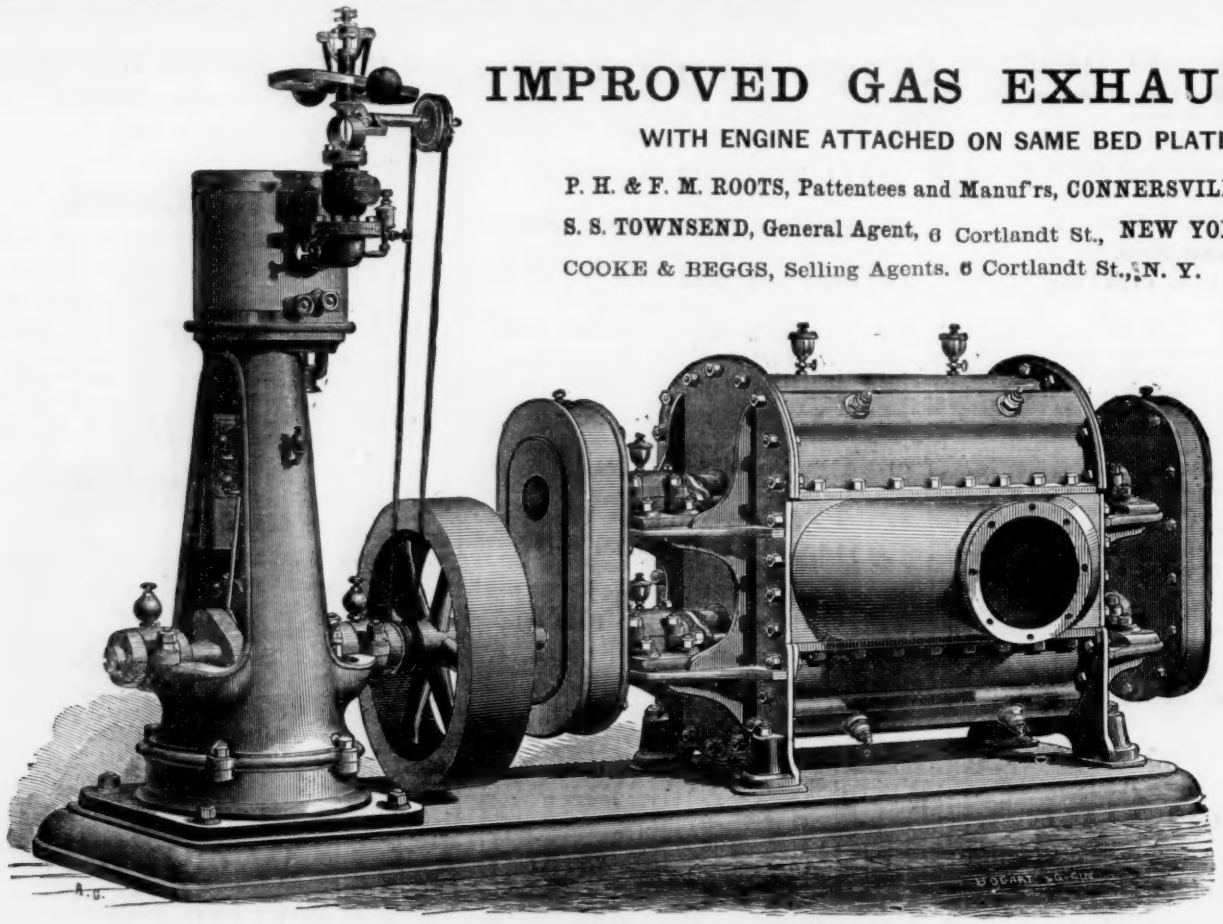

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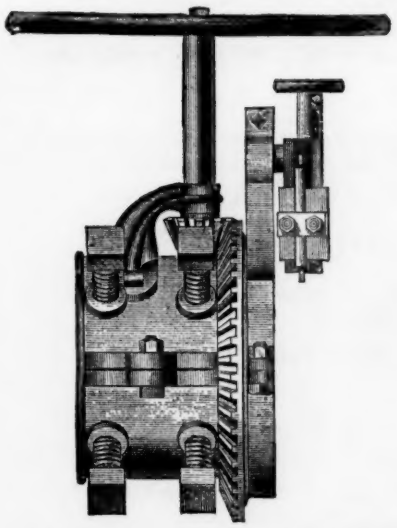

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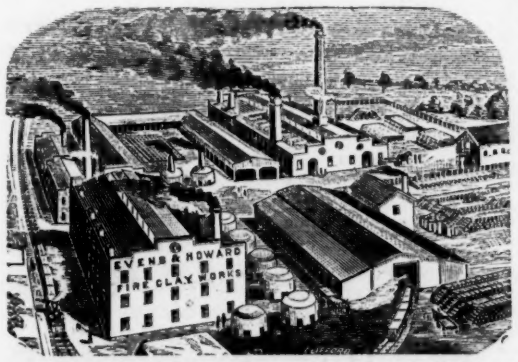

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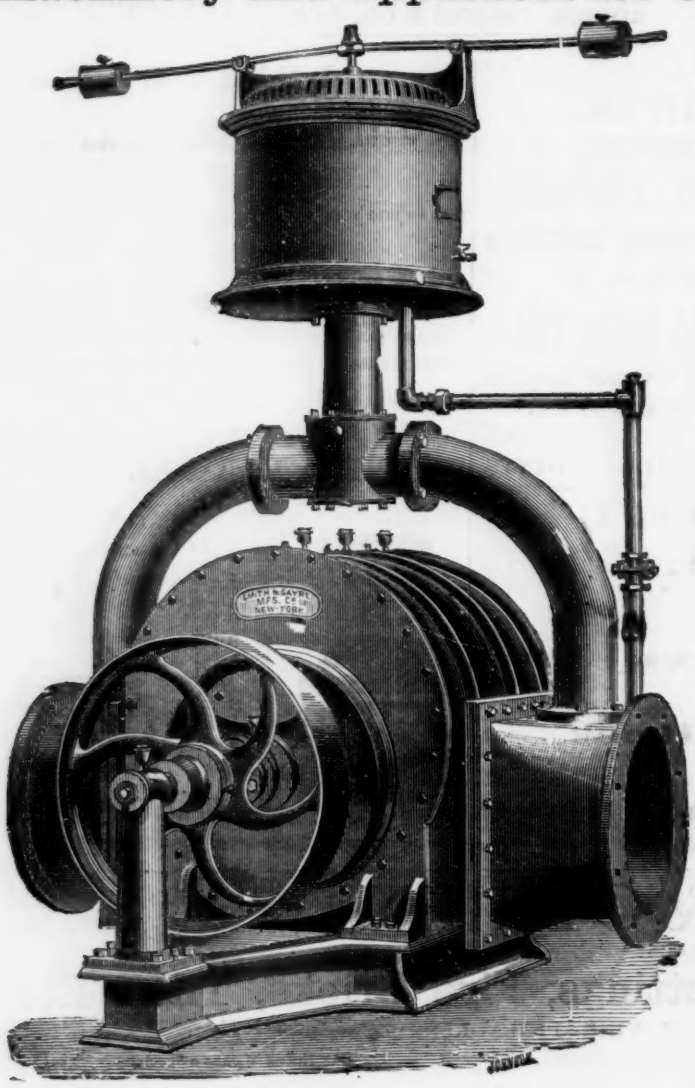

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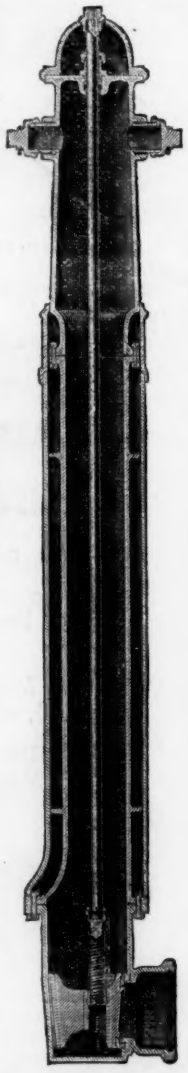

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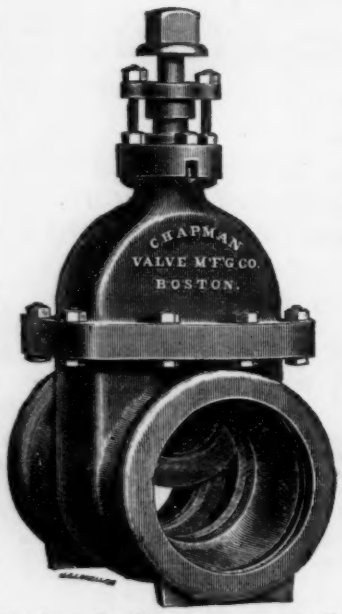

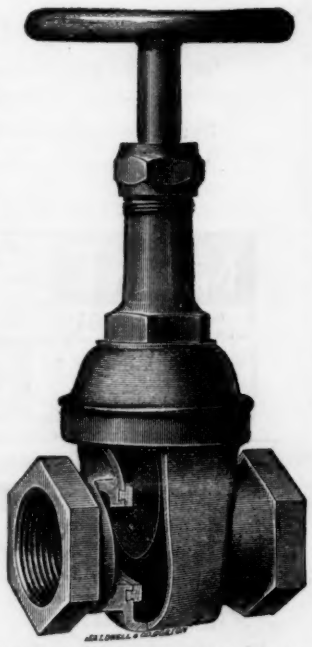

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Clinton Gas-Light Company,	"
Milford Gas-Light Company,	"
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Lawrence Gas-Light Company,	"
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Lynn Gas-Light Company,	"
Springfield Gas-Light Company,	"
Worcester Gas-Light Company,	Mass.
Taunton Gas-Light Company,	"
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Portland Gas-Light Company,	Maine.
Lewiston Gas-Light Company,	"
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Nashua Gas-Light Company,	"
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Louisville Gas-Light Company,	Louisville, Ky.
Cincinnati Gas-Light Company,	Cincinnati, O.
People's Gas-Light Company,	Brooklyn, N.Y.
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